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ABSTRACT

Many branches of manufacturing industries have been highly successful in the Appalachian region; others have failed to achieve anticipated operating and employment results; and still others have suspended operations after a short time. This mixed history of accomplishment and failure has not been satisfactorily explained by traditional analyses. The solution of regional problems requires earnest and careful study and the development of programs suited to the particular conditions in each case. The important objectives of a regional development program should be (1) investment of those public facilities which are most likely to promote private investment and thereby employment in the region and (2) utilization of general and vocational education in manpower development programs. The appropriateness of recommendations will vary from one subarea of Appalachia to another since priorities within a given area are determined by its prospects for industrial development. The intention of general recommendations is to cut across industry lines and specify public activities which are generally useful in making areas attractive to public employers. (Related documents are RC 004 210 and RC 004 211.) (EJ)

ED044188

APPALACHIAN RESEARCH REPORT NO. 4

**INDUSTRIAL LOCATION RESEARCH STUDIES:
SUMMARY AND RECOMMENDATIONS**

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1666 Connecticut Avenue NW
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by

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Fantus Area Research Division
430 Park Avenue
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INDUSTRIAL LOCATION RESEARCH STUDIES: SUMMARY AND RECOMMENDATIONS

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I - INTRODUCTION

Many branches of manufacturing industry have been highly successful in the Appalachian Region. Others, however, have failed to achieve anticipated operating results, a sustained level of new investment, or optimum employment. Still others have suspended operations after a short period. This mixed history of accomplishment and failures--often involving the same branches or similar branches of industry-- has not been satisfactorily explained by traditional statistical analyses, economic models or theories.

Many efforts to fit answers to the problems of economic growth in the region have been at the level of what Philip Sporn calls "bromidic prescriptions". As Mr. Sporn points out in Technology and the American Economy, "there is a great deal of diversity among regions, and even in the case of Appalachia, the region is characterized more by diversity among its several parts than by any uniformity. The solution of regional problems, therefore, requires earnest and careful study and the development of programs at the regional and local level to develop solutions suited to the particular conditions in each case."

This statement is fully consistent with the belief of experienced area development groups and the plant location consultant that economic development programs can be designed to influence the location, timing, or growth rate of private business-- i.e., where, when and on what scale it will operate. From the vantage point of the plant location consultant, there are two prerequisites for successful programs:

(1) an incisive understanding of how the locational search for specific industries operates under conditions prevailing in the competitive marketplace, and

(2) an awareness of how communities can selectively improve their response to the needs of site-seeking businessmen.

For an area or a community to anticipate the needs of all types of industry is infinitely difficult. For action groups to systematically and selectively pursue development opportunities based on specific industry insights and a knowledge of recent locational strategy is eminently practicable. Accordingly, the Appalachian Industry Location Studies Program was conceived:

- (1) to identify industries which can be expected to have significant growth potential in the region;
- (2) to select industries which offer multiple location opportunities within the framework of economic development programs for the region;

- (3) to specify the locational characteristics of the selected industries;
- (4) to evaluate the relative commercial importance of the specified locational determinants; and
- (5) to determine the extent to which the competitive position of the region for the selected industries can be enhanced by coordinated programs of public investment.

In its totality, the program embraces 25 individual industry location studies. The purpose of these studies is not to identify industrial prospects for specific planning regions of Appalachia, nor is it to predict that a specific type of firm will locate in a specific small area of the region. Instead, the purpose is to convey to planning and action groups a systematic rationale for evaluating the locational attributes of an area for the selected industries.

This Summary Report is an overview of the 25 industries, an account of how and why they were selected, a summary and synthesis of major findings and conclusions and, finally, the formulation of a series of recommendations designed to make Appalachia more attractive to these industries.

It is significant to note that while these recommendations were formulated from the findings of the 25 individual location studies, actions taken on most fronts will serve substantially to improve the overall competitive position of the Region for all industries.

II - SUMMARY AND CONCLUSIONS

Introduction

One of the principal objectives of a regional development program should be to invest in those public facilities which are most likely to promote private investment and thereby employment in the region. The 25 industrial studies completed by this consultant were selected because of their peculiar relevance to the future prospects for industrial development in Appalachia. Insofar as possible the locational requirements of such industries should be taken into account in planning the development programs for each of the sub-areas in the region.

The first step to take in developing an understanding of why industry makes investments at particular locations is to recognize that the decision-making unit is a company. In other words, the location decision is an aspect of business administration that must be resolved--like other issues--in the framework of the prevailing market conditions and forces. It is a community function to cooperate in the decision-making process.

Many location decisions result in unbalanced growth for the local or regional economies they affect. Some may propel the economy forward in a jerky manner but also more quickly than any preconceived theories of balanced growth. Subsequent recommendations in this report are designed to enhance, most effectively, the competitive position of Appalachia for all of the industries studied. However, to determine the impact of any single recommendation on a specific industry, one must turn to the individual location studies.

All Industry Location Studies follow a prescribed format. It is designed to define the industry (size, markets, concentration, prevalence), indicate where and how it is growing, and to describe pertinent technology and trends. The heart of the report is contained in a subsequent section which defines, describes, and quantifies to the extent possible, the locational realities of the industry today--that is, those factors of significant influence in the locational decision. Moreover, each such factor contains an indication of the relative weight afforded it by the site-seeking executive.

In the typical discussion of locational factors, sufficient information is included to allow an evaluation of any given area's potential for the industry. As an example, Report No. 11 "Mobile Homes and Special Purpose Vehicles"

establishes general criteria on the market orientation of new plants--the basic factor delimiting that industry's initial search. Within that framework, transportation expenses are related to outbound shipping charges and the resultant cost effect per unit. Labor requirements are defined in terms of skills, supply, and the relative cost of wages and fringe benefits. In addition to the foregoing major considerations, the requirements and relative importance of such factors as sites, transportation services, utilities, taxation, financing, and others are discussed.

Labor, as the element most common in the location decision, is usually presented in terms of a desired "selectivity ratio"--that is, the number of basically qualified candidates for each position, necessary to allow selection of an acceptable, productive work force. The ratio can further be related to an area's supply potential. This latter factor reflects a statistical evaluation of the total potential based on normal participation rates, employment shifts and the like. Thus, as an example, to achieve a 4 or 5 to 1 selectivity ratio, the supply potential may have to be in the area of 8 or 12 to 1.

In the last section of each report, specific public activities are evaluated for their impact and ability to assist directly in attracting new private investment of that industry.

Distinctive Industry Characteristics

As has already been remarked, the 25 industries singled out for individual analysis are ones which (1) have significant growth potential in Appalachia, and (2) offer multiple location opportunities within the region. These, then, are the first two common denominators to be noted for the 25 industries, defined and described in Table 1 of Appendix A.

Other common characteristics come into view when observations are made from various vantage points. The first of these concerns production of durable goods and nondurables.

Durables-Nondurables Mix

Sixteen of the Appalachian Industry Location Studies concern the production of durable goods. These are:

- Electrical component parts
- Textile machinery
- Office machinery
- Motor vehicle parts
- Materials handling equipment
- Mobile homes
- Instruments and controls
- Metal stampings
- Aircraft and aerospace parts
- Primary aluminum
- Nonferrous castings
- Malleable and ductile iron castings
- Nonferrous rolling mill products
- Plastic and powder metal parts
- Refractory metals
- Primary steel and steel mill products

The 9 nondurable goods industries are:

- Paper and allied products
- Textile mill products
- Apparel
- Printing and allied industries
- Chlor-alkalies
- Noncellulosic synthetic fibers
- Foamed plastic products
- Meats, dried and frozen produce
- Plastic resins

Appalachian Specialization in the Industries

Industries which already have relatively large shares of their productive capacity in Appalachia include pulp and paper, textiles, chlor-alkalies, primary steel, synthetic fibers, malleable and ductile iron casting and primary aluminum (see Appendix A, Table 2). In this sense, Appalachia can be said to have a high degree of specialization for these industries. From another point of view, Appalachian specialization cannot be considered particularly high since operations of these 6 industries are not well dispersed throughout the 12 states of the region.

Industries which thus far have only a limited foothold in Appalachia comprise printing, electrical component parts, office machinery, materials handling equipment, motor vehicle parts, mobile homes, instruments metal stampings, aircraft and aerospace parts, nonferrous castings, and plastic resins. Specialization is low both in Appalachia's share of the industries' plants and the number of states in which they operate.

The remaining 7 industries have about average representation in Appalachia. That is to say that the region's share of the nation's establishments is roughly proportionate to regional population (9% of U.S.).

Industry Growth Trends

From the accompanying Table 1, it can be seen that most of the 25 industries analyzed can expect somewhat lower annual rates of growth in the 1965-75 decade than those experienced in the five years preceding. Nevertheless, all 25 industries will grow faster than the national economy--as, indeed, they have in the past.

Growth rates differ not only among the industries but also within various branches of the same industry. In paper and allied products, for example, a compound annual percentage increase of 2 percent for newsprint contrasts with an expected 6 percent annual gain for book, magazine and similar printing papers.

The ranges shown, therefore, reflect industry expectations for specific product lines. Many of these products are fully established in the marketplace. Still others, such as some new synthetic fibers, will spurt sharply, achieving growth rates as high as 30 percent.

There is no way of forecasting at a fine level of industry detail exactly what these increases in sales or consumption will mean in capital investment commitments over the 1965-75 decade. One measure of the scale on which the industries spend in a year of good business conditions is provided by Column 3 of Table 1.

Economic Impacts

No single yardstick is suitable for measuring the economic benefits of an industry to a region, much less a community. Townspeople and merchants, however, are the first to feel the impact of new paychecks in a locale. This impact can be quantified in several ways.

Table 1.
Selected Growth and Investment Characteristics 1/

Industry	Column 1:	Column 2:	Column 3:
	Average Annual Growth Rate 1960-1965 (%)	Projected Average Annual Growth Rate 1965-1970 (%) <u>2/</u>	Capital Expenditures Estimated for 1964 (\$ Million)
1. Paper & Allied Products	6.4	2.0-6.0	886
2. Textile Mill Products	5.9	7.0-17.4	492
3. Apparel	6.1	3.5-8.2	124
4. Printing & Allied Industries	4.1	3.5-9.0	463
5. Electrical Component Parts	7.2	7.0-14.0	889
6. Textile Machinery Pumps & Valves	7.6	7.0-10.0	100
7. Office Machinery	7.2	5.0-12.0	113
8. Motor Vehicle Parts	7.2	3.0-4.0	529
9. Chlor-Alkali Industry	7.6	5.0-8.7	72
10. Materials Handling Equipment	7.6	12.0-15.0	20
11. Mobile Homes	9.2	10.0-15.0	20
12. Instruments & Controls	5.2	7.0-17.0	62
13. Noncellulosic Synthetic Fibers	15.5	7.3-30.0	164
14. Metal Stampings	7.3	7.0-8.0	156
15. Aircraft & Aerospace Parts	5.1	7.0-12.0	59
16. Primary Aluminum Industry	5.8	7.0-10.0	52
17. Nonferrous Castings	9.4	6.0-7.0	45
18. Malleable & Ductile	6.1	5.0-14.0	126
19. Foamed Plastic Products	10.1	7.0-10.0	25
20. Rolling, Drawing, and Extruding of Nonferrous Metals	9.4	7.0-8.0	194
21. Meats, Dried & Frozen Produce	6.8	• 5.0-7.0	56
22. Plastic & Powder Metal Products	10.1	10.0-15.0	184
23. Refractory Metals	5.8	5.0-17.0	125
24. Primary Steel & Steel Mill Products	5.3	2.5-5.0	1,363
25. Plastic Resins	15.5	6.7-40.0	20

1/ Sources: Fantus Area Research files; 1964 Annual Survey of Manufactures

2/ Growth projections based on industry consensus of rise in sales and/or consumption. For further discussion of growth, see "Industry Growth Characteristics" in Appendix A.

One such method is to examine the expectable size of a single new payroll in each of the industries. Of course, there is no such thing as an "average" size plant. The most useful approximation is to compute payroll amounts for establishments that are of sizes which to the location analyst are fairly representative of recent location trends. This has been done in Table 2 (column 2). It is immediately apparent that differences in annual payrolls reflect not only establishment sizes "typical" in each industry but also wage and salary patterns representative of the industry.

It would be easy but erroneous for a community to conclude that attraction of a steel works is a more "desirable" goal than locating an apparel plant, because the former disburses much larger wage and salary payments than the latter. The sobering consideration here is the demonstrable fact that many new apparel plants open their doors each year, while the location of a new steel works, even a smaller branch of the industry, is a comparatively rare event. Hence, the apparel industry, one which is highly mobile, is a goal to which more communities can realistically aspire.

There are other good reasons, too, for considering economic impact and "desirability" within a much broader framework. These are variously designated as multiplier, leverage and ripple effects created by a new industry coming to a community, or an established industry expanding. Input-output analysis, developed by Leontief for national economic measurements, is one. The prospects for attracting satellite industries is another.

Column 1 of Table 2 presents selected measures of inter-industry impact derived from input-output analysis of the 1958 inter-industry relation study. Four measures are given in Column 1. Two will be considered in the following discussion.

In general, industries which purchase a fairly large proportion of their requirements for output from a number of other industries tend to create rather large ripple effects in the economy. Experience with the automobile industry on the national scene confirms this observation. This is also true in the manufacture of aircraft and aerospace parts.

The table (row 15) tells us that for each dollar of output the aircraft and aerospace parts industry must make direct purchases of 33.9 cents from other industries and 19.2 cents from other firms within its own industry--a total of 53.1 cents worth of direct purchases. Significantly, it takes six industries to supply the first half of the purchases from others. Further, 7 industries in all are involved in supplying the 53.1 cents worth of direct purchases.

Table 2.
Selected Measures of Economic Impact

Report No.	Industry	Inter-Industry Impact 1/	Annual Purchases		Major Supplying Industry 4/	Potential Satellite Industries 5/
			Wage Impact (millions) 2/	From Leading Supplier 3/		
1.	Paper and Allied Products	46.3(4)/18.9(3)	\$ 8.1	189-432	Paper	Chlor-Alkalies, Sodium Silicate, Rosins, Resins, Tree Farming
2.	Textile Mill Products	39.8(2)/34.6(11)	4.1	165-347	Textiles	Mill Supplies, Machinery Repair, Chemical Distributors
3.	Apparel	44.2(1)/17.2(1)	1.2	273	Textiles	Machinery Repair, Distribution Warehousing
4.	Printing and Allied Industries	49.8(3)/13.0(1)	3.5	172	Paper	Platemaking, Repair Services, Paper Merchants
5.	Electrical Component Parts	53.8(8)/2.2(1)	4.7	72	Nonferrous Metals	Industrial Gas Distributors, Tool and Die, Electroplating
6.	Textile Machinery/Pumps and Valves	51.4(5)/4.9(1)	5.6	193	Iron and Steel	Machine Shops, Tool and Die, Mill Suppliers, Foundries
7.	Office Machinery	34.6(6)/9.1(2)	20.8	91	Office Machinery	Tool and Die, Die Casting, Mill and Electrical Suppliers, Metal Stampings
8.	Motor Vehicle Parts	41.5(5)/29.5(9)	4.4	295	Motor Vehicle Parts	Tool and Die, Metal Stampings, Rubber and Plastic Parts
9.	Chlor-Alkali Industry	42.0(7)/19.4(6)	3.4	194	Chemical	Organic Chemicals, Herbicides, Plastics, Contract Motor Carriers
10.	Materials Handling Equipment	59.3(5)/4.0(1)	2.6	107	Iron and Steel	Foundries, Mill Suppliers, Tool and Die
11.	Mobile Homes	41.5(5)/29.5(9)	2.2	110	Lumber	Sheet Metal, Wheel and Axle Assembly, Unitized Fixtures
12.	Instruments and Controls	47.8(8)/6.7(2)	10.5	67	Instruments	Metal Distributors, Electroplating, Tool and Die
13.	Noncellulosic Synthetic Fibers	57.8(1)/2.7(1)	21.6	341	Chemicals	Corrugated Containers, Chemicals
14.	Metal Stampings	52.0(2)/4.0(1)	1.9	199	Iron and Steel	Mill Supplies, Machine Shops, Tool and Die, Electroplating, Steel Distribution Centers
15.	Aircraft and Aerospace Parts	33.9(6)/19.2(7)	10.1	190	Aircraft Parts	Machine Shops, Tool and Die, Research and Development
16.	Primary Aluminum Industry	41.2(4)/30.4(11)	19.3	304	Nonferrous Metals	Electrical Repair, Machine Shops, Cookware, Auto Parts
17.	Nonferrous Castings	41.2(4)/30.4(11)	2.6	304	Nonferrous Metals	Patternmaking, Electroplating, Tool and Die
18.	Malleable and Ductile Castings	37.8(7)/22.7(11)	6.1	227	Iron and Steel	Patternmaking, Machine Shops, Tool and Die
19.	Foam/C Plastic Products	51.4(3)/3.1(1)	1.4	143	Plastics	Contract Motor Carriers, Chemical Distributors
20.	Rolling, Drawing, and Extruding of Nonferrous Metals	41.2(4)/30.4(11)	6.4	304	Nonferrous Metals	Wire Product Fabricators, Tool and Die, Metal Treating Chemicals
21.	Meats, Dried and Frozen Produce	57.7(2)/16.7(1)	5.6	161	Livestock	Fertilizer, Eggs, Hatcheries, Feed Lots, Truck Farming
22.	Plastic and Powder Metal Products	51.4(3)/3.1(1)	1.4	143	Plastics	Tool and Die
23.	Refractory Metals	41.2(4)/30.4(11)	8.8	175	Nonferrous Metals	Aircraft Parts, Fabricated Products, Ore Dressing
24.	Primary Steel and Steel Mill Products	37.8(7)/22.7(11)	21.8	227	Iron and Steel	Machine Shops, Refractories, Cookware, Kitchenware
25.	Plastic Resins	57.8(1)/2.7(1)	1.0	341	Chemicals	Chemical Suppliers, Contract Motor Carriers

Table 2. - cont'd

NOTES:

- 1/ Inter-Industry Impact: A four-factor numerical expression. A(C)/B(D) based upon the 1958 OBE input-output study of the inter-industry structure of the United States:
- A. Input of direct requirements from other industries per dollar output in the named industry.
 - B. Input of direct requirements from the named industry itself.
 - C. Number of other industries providing 50% of the other industries direct input.
 - D. Number of other industries needed to approximate the direct input of the named industry.
- 2/ Annual Direct Wage Impact based on the 1965 average annual wage for production workers, typical employment size, and an economic velocity of 3.
- 3/ Dollars (1958) per \$1,000 gross output going to purchases from the leading supplier.
Source: 1958 Interindustry Relations Study.
- 4/ Source: 1958 Interindustry Relations Study.
- 5/ Industries most likely to be attracted by new manufacturing facilities.

It is impossible to predict from these input-output relationships that all of the benefits of these direct purchases (or ripple effect) will accrue to the community where the industry operates. More than likely they will not, because much of the money will be spent in other parts of the country. Nevertheless, input-output figures are valid as a means of indicating possibilities for turnover of money in an area which goes well beyond the size of a payroll.

Likely satellite industries which might eventually locate in the general vicinity of a primary industry are listed in Table 2. Some are clearly near-term candidates, as for example, paper-making chemicals to supply the pulp and paper industry. Others, such as tool and die shops, may take years to materialize.

Whatever the probable size of the ripple effect created by any single industry, Table 2 clearly indicates that any of the 25 industries will exert considerable leverage on the local economies of Appalachia.

Locational Requirements and their Significance

Each of the 25 Appalachian Industry Location Studies examines and evaluates all factors which firms in those industries consider when selecting a location. Table 3, which follows, attempts the impossible task of recapitulating the relative importance of those factors which recur most often in the location decision. This is done for the express purpose of bringing into sharper focus Section III of this report, which formulates recommendations for improving Appalachia's competitive position.

With the cautionary note that the individual location studies should be consulted for the nuances of location decision-making, it is still possible to reach certain useful conclusions and a synthesis of findings and opinion from Table 3. To begin with, the table is constructed with recognition that certain location requirements of an industry may be relatively inflexible while others may be compromised within limits. The economist refers to this latter aspect as "substitutability of factors". The businessman speaks of "trade-offs".

Accordingly, Table 3 identifies the relative importance of primary locational factors with the following scale of values:

- C - Critical, inflexible factors required for locational consideration.
- P - Primary, relatively inflexible factors weighing heavily in the locational decision.

Table 3.
Comparative Summary of Primary Locational Factors

Report No.	Industry	Manpower Training Assistance	Labor Supply	Labor Cost Advan-	Labor Unique Site Require-ments	Transportation Costs	Utilities	Urban Orientation	Proximity to Customers	Proximity to Raw Materials	Other (See Footnote)
1.	Paper and Allied Products		P		C	I	E _p F ₁ S _c W _c	P(7)	C(7)	C	1,2,5
2.	Textile Mill Products	P	C	C	P	P	E ₁ F ₁ S _p W _p				L
3.	Apparel	C	C	C		I					
4.	Printing and Allied Industries	I	P	I		I		P	C		6
5.	Electrical Component Parts	P	C	P		I			C		
6.	Textile Machinery/Pumps and Valves	C	P	I			E ₁	I	P		3
7.	Office Machinery	P	P			P		C			3,4,6
8.	Motor Vehicle Parts	P	P	P		I	E _c W _p	I	P		1
9.	Chlor-Alkali Industry				C	C			C		1
10.	Materials Handling Equipment	P	C	I	I	P					6
11.	Mobile Homes	I	P	P		C		I	P		4,6
12.	Instruments and Controls	P	P	I		I		P	I		1.4
13.	Noncellulosic Synthetic Fibers	I	C	I	C	P	E _p F ₁ W _p	I	I		
14.	Metal Stampings	P	I	P		I					
15.	Aircraft and Aerospace Parts	P	C	I	I	C	E _c F _p S _i W ₁	I	I	I	3,4,6
16.	Primary Aluminum Industry		I		C	C					1,3,4
17.	Nonferrous Castings	P	P			I		I	P		1,3
18.	Malleable and Ductile Castings	I	P	P		C	E _p	I	C		1,4
19.	Foamed Plastic Products		I			C		P(8)	C(8)		
20.	Rolling, Drawing, and Extruding of Nonferrous Metals	I	P				E _p F _p W _p	P	P	I	1,3
21.	Meats, Dried and Frozen Produce	I	C	I	I	C	E _p S _c W _p		I	C	3,5
22.	Plastic and Powder Metal Products		I	P		I	E ₁		P		
23.	Refractory Metals		P		C	P	E _p	I	P		/1
24.	Primary Steel and Steel Mill Products		I		C	C	E _p F ₁ S _c W _c		C	P	1,3
25.	Plastic Resins	I			I	I	E ₁ S _p W _p	P	P		4

Table 3. - cont'd

NOTES:

- (1) Highly sensitive to state and local taxation.
- (2) Requires woodland ownership.
- (3) Requires supporting services.
- (4) Prefers proximity to community colleges.
- (5) Desires active program of soil and land development.
- (6) Desires community services and improvements.
- (7) Applies only to corrugated container manufacturing.
- (8) Applies primarily to producers of foam packaging.

Key to Locational Factor Evaluations:

- C(c) - Critical, inflexible factors required for locational consideration.
P(p) - Primary, relatively inflexible factors weighing heavily in the locational decision.
I(i) - Important factors which must be considered in determining new locations, but may be subject to trade-off against other elements of the locational equation.
(Blank) - Space indicates factors which generally are of minor or no importance in locational decisions.

Utility Codes:

- E - Electric power
F - Fuel (gas, oil or coal)
S - Sewerage treatment and disposal
W - Water for processing
W_p - Subscript denotes locational evaluation of utility requirements.

I - Important factors which must be considered but which may be traded off for other compensating advantages when the final locational decision is made.

This scale of values is valid reading across the rows. It does not, however, have any validity reading down the columns, since cruciality in one industry seldom has equivalence with cruciality in another.

In the discussions which follow each of the primary location factors is considered with the insights of the location analyst. Particular attention is paid to the number of industries for which each factor has relevance (but not equivalence).

Manpower Training

Something more than a question of semantics separates community spokesmen and location-seeking businessmen when they both talk about manpower training programs. Increasingly, the businessman, starting up a new plant thinks in terms of what the Pennsylvania Governor's Council of Business and Industry calls "training by requisition"--that is, public, on-the-spot training of a work force for specific jobs that must be filled when a new facility is about to be established.

Among the 25 industries in Table 3 this kind of training is crucial in the location of apparel and textile machinery plants. It weighs heavily in the location decision for 9 other industries. In most instances firms in these industries would be unwilling to compromise this locational objective when alternatives are available, since start-up costs would be adversely affected.

Labor Supply

Only 7 of the named industries can afford to consider a location where an abundant and close-in supply of employable labor cannot be demonstrated locally. These industries tend to be of two types: (1) high wage industries which create their own labor markets, and (2) establishments with a relatively small labor requirement.

In contrast a demonstrably large supply of employable labor within a few miles of the proposed plant location is crucial for these industries: textiles, apparel, electrical component parts, materials handling equipment, synthetic fibers, aircraft and aerospace parts, and the processing of meats and produce.

Likewise, the existence of a sizable labor pool is only a degree less important to all other industries.

Labor supply has many parameters. From a hiring standpoint, it includes education levels, age profiles and previous exposure to industrial discipline.

Labor Cost Advantage

Community groups often lose sight of the fact that location moves are made to reduce costs. There are a number of avenues to lower costs. For some industries, textiles for one, wage differentials have primacy. Such differentials also have paramount importance in the following industries: electrical component parts, motor vehicle parts, mobile homes, metal stampings and the fabrication of plastic and metal powder parts.

Frequently the search for a location offering favorable wage differentials will be shaped by the type of union membership prevailing in a community, male---female employment ratios in established manufacturing, and expectable responsiveness to incentive wage patterns and shift work.

Wrapped up in the manufacturer's persistent search for favorable hourly wage differentials is concern for other factors which bear heavily on his total employment costs. These include fringe benefits, work rules, turnover and absenteeism. Communities which appear to offer equivalence of average hourly earnings may in fact be separated by a big dollar gap because of these other factors.

Further, apparent equivalence in occupational job rates may hide the more basic fact that job titles and labor grades are not similar. If, for example, an electrician in a metal fabricating plant receives a lower wage rate than one in the basic steel industry, the proof is far from conclusive that the overall rate structure in the fabricating plant is lower. It may simply mean that the duties and skills for that particular job are lower. This, indeed, is the case if the fabricator is committed to use of the Steelworkers Job Evaluation Plan with identical (to basic steel) payments for each labor grade.

Thus even in those industries assumed to operate on "national" wage patterns there can be substantial differences in unit employment costs from one community to another. Accordingly Column 3 of Table 3 must be read with a judicious eye.

Unique Site Requirements

Of the industries analyzed in this program, only pulp and paper, chlor-alkalies, synthetic fibers, primary aluminum, refractory metals and primary steel can be said to have site requirements which are exceptionally large (hundreds of acres) or otherwise unique. In one sense or another, these can be called "wet" industries because they must be on or near a waterway for barge transportation, water intake or effluent disposal. The latter two uses of water will have primary importance for some textile mills, which also have become increasingly large users of land.

For those industries where "unique sites requirements" are not indicated it cannot be assumed that site selection is a matter to be relegated to subsidiary importance. In the final selection of one location over another the community which can convey an attractive, serviced 40-acre "general-purpose" site has a major advantage which quickly may erase other so-called trade-offs.

Transportation Costs

Labor costs and total transportation costs (inbound and outbound freight charges) frequently are paired in trade-offs. For example, in considering alternative locations the manufacturer may accept somewhat higher freight costs if compensating wage advantages are available to him. Thus a large user of sheet steel for metal stampings can accept the freight penalty that goes with moving, say, 200 miles farther away from his mill source of steel. He can do this because the wage differential needed to offset the freight penalty may amount to only 4 or 5 cents an hour, if his is a fairly large operation.

Seldom in Appalachia, however, will the manufacturer be willing to consider this kind of trade in a reverse sense--that is, accepting a wage penalty because there appears to be an offsetting freight advantage. In short, the trading-off process for labor costs and transportation costs usually operates in only one direction, given the competitive realities of the marketplace.

From Column 5 of Table 3 it can be seen that transportation costs are designated as "crucial" (C) for 8 industries and as "primary" (P) for 4 industries. More often than not, it is outbound transportation charges that control in these industries (e.g. caustic soda and chlorine, mobile homes, primary aluminum, iron castings, foamed plastics, nonferrous rolling mill products and steel mill products).

This tends to be true whether the product is sold F.O.B. producing point, with transportation charges prepaid by the manufacturer, or purchased on a "delivered pricing" or freight equalized structure. Whatever the basis, the amount of freight that must be charged or absorbed affects the producer's competitive position.

Transportation Services

Both the availability and quality of transportation services add up to a cost element distinct from freight charges. Poor delivery service to customers is a major cause of lost business. It is also one that is frequently masked by other factors. On the inbound side, sluggish deliveries of raw materials and supplies make it necessary to stock excessively large inventories. Carrying charges on inventories add 20 to 30 percent or more to the cost of raw materials.

The cruciality of transportation services should be noted for these industries: electrical component parts, motor vehicle parts, caustic soda and chlorine, metal stampings, primary aluminum, nonferrous castings, malleable and ductile iron castings, and primary steel. Note also that there are 12 additional industries where only limited compromises of this factor may be accepted.

The thicket of transportation problems which confronts the site-seeking businessmen in many parts of Appalachia is given comprehensive analysis in Section III of this report under "Transportation Policies."

Utilities

The number of industries for which energy, water and waste disposal are crucial location factors is relatively small. The cost of energy has primacy in the production of caustic soda and chlorine, primary aluminum, and electric furnace operations for ferroalloys and some refractory metals. It has greater-than-average importance for pulp and paper, malleable and ductile iron castings, the rolling of nonferrous mill products, meat packing and steel production.

The theoretical economist tends to approach the cost of energy as a percentage of total manufacturing costs. In contrast, the businessman thinks of absolute costs and cost differentials. To put the matter another way, a cost differential of, say, \$200,000 a year has far greater significance for him than the percent this

represents of his total manufacturing costs. Much the same can be said of his view of fuel bills.

Water and waste disposal tend to loom as key cost factors only when there is a large use of water for consumptive and processing purposes. This is certainly true for pulp and paper, textile dyeing and finishing, the production of caustic soda and chlorine, rolling mill operations, poultry processing and various branches of the steel industry.

Waste disposal costs have several implications. For one, they may mean excessive land acquisition and development costs to provide lagooning, as in the pulp and paper industry. For another, they are often a limiting factor in deciding whether an industry can expand at an existing site, as in textile finishing and broiler processing. Then, too, there are thorny legal questions which may have interstate significance, which to resolve, would require extensive time and money.

With stricter Federal standards now in effect, an increasing number of industries which normally consider treating their own wastes will be looking for community situations where public sewage disposal systems can take over.

Urban Orientation

From one firm to another there is a broad spectrum of ideas on the meaning of urban orientation. For some it signifies location within a sizable city. For others, it connotes suburban operations. For still others, the urban orientation requirement, if there is any, can be satisfied with an exurban site that has fairly close orientation to a large urban area.

If it is possible to generalize--and doubt exists on that point--the only industries in the Appalachian Industry Location Studies Program for which urban orientation has a high degree of significance are paper boxes and corrugated shipping containers, various branches of printing, office machinery, the larger establishments in the instrument and controls industry, plastics for packaging, and the production of plastic resin compositions and adhesives.

Urban orientation is, indeed, a trade-off factor. Paired with it in many trade-offs are land acquisition costs and a female work force needing supplementary family income.

Proximity to Customers

Many branch manufacturing plants are established to achieve deeper penetration of a market than can be won by serving the market from a headquarters plant or distribution warehouse. The "market" may be a single customer, a compact cluster of customers, a region, or a subregion. Additional business picked up by moving closer to the buyer may have far greater significance than any savings in freight costs.

Industries for which these considerations have overriding importance include paper containers, business forms, certain electrical component parts, textile machinery, pumps and valves, some automobile parts, caustic soda and chlorine, many types of materials handling equipment, mobile homes and school busses, metal stampings, many metal castings, aluminum rolling mill products, refractory metals, steel mill products and plastic resin compositions.

For all its importance, proximity to customers can often be traded off from one community to another. Important exceptions where flexibility is more limited include chlor-alkalies, contract metal stampings, foamed plastic packaging and industrial gases for primary steel. In these exceptions proximity to a customer frequently means an across-the-street or over-the-fence relationship.

Proximity to Raw Materials

Among the glittering generalities of Appalachian literature is the one that the region's extractive resources are the keystone of its industrial future. Indeed, Appalachia does have impressive resources of timber and energy. Except in a few instances, however, it is difficult to establish any crucial relationship between these resources and the needs of manufacturing industries which now operate in the region or are likely candidates for new operations.

The pulp and paper industry is a major exception, of course, as are meat packing, poultry processing and other branches of agribusiness, as well as some aspects of the primary metal industries. But for the large majority of industries it must be concluded that human resources rather than extractive resources will shape the majority of industrial expansions.

Other Factors

The common denominator of Column 10 in Table 3 is state

and local taxation. While this conjures up many aspects of business taxes, it can in many instances be reduced to tax burdens on machinery and equipment or inventory, or both.

No factor in plant location is more difficult to pin down. Tax rate schedules and manuals say one thing. Surveys of government finances convey other ideas. Arms-length bargaining with the tax assessor gives still different answers.

As in the case of utility bills, the businessman tends to look at the dollar amounts of dollar differences rather than the percentages of his total operating costs these might represent. For the capital intensive industry, taxes on machinery and equipment obviously are a great deal more important than real estate taxes.

Further tax burdens are determined not only by rates and assessment ratios but also in the manner of assessment. The latter prominently involves allowable methods of depreciation.

Some Appalachian States give their communities considerable leeway in exempting the machinery and equipment of industrial newcomers. Others have sharply reduced the tax take on inventories. It is not the intent of this report to argue the merits of individual state actions. Instead, the purpose is to make clear that the various states operate under different philosophies. Accordingly, it cannot be said that taxation is a regional issue. More to the point is the observation that the 12 states do not choose to compete on equal footing in dealing with what to the businessman is an important cost element subject to conscious locational choice.

Summary

Obviously the appropriateness of these recommendations will vary in importance from one sub-area of Appalachia to another. The priorities within a sub-area are determined primarily by its prospects for industrial development. Thus, in an area which already possesses good transportation access and where there is some existing potential for attracting market sensitive industries the highest priority for public policies may fall on the development of certain skills in the labor force or the upgrading of municipal water supplies rather than transportation investment which might normally be assumed.

The individual industry monographs should be examined to ascertain the importance of various public actions in attracting a given industry. The intention of the following general recommendations is to cut across industry lines and specify public activities which are generally useful in making areas attractive to public employers. These recommendations are both a distillation of the individual industry studies and a list of additional actions which, though common to some of these industries, are also probably attractive to industries not studied. The recommendations have been sequenced in terms of our judgment with respect to their overall priorities. These will necessarily differ for any given industry and for a particular area that may be studied in terms of assessing the probability of location or expansion of these industries or industry in general.

III - IMPROVING THE COMPETITIVE POSITION OF APPALACHIA FOR INDUSTRY

Introduction

Experienced observers of the industrial development function are the first to note that there are always some community action groups which do a conspicuously better job than their competitors year in and year out. Suspicion exists in envious quarters that these are the "lucky" communities--lucky enough to have the right geographical location, lucky enough to have an overflowing industry-getting war chest, lucky enough to have inspired leadership at the helm.

Actually each of these explanations is meaningless. There is no "right" geographical location in an absolute sense. Further, even the more successful industrial development efforts tend to be chronically underfinanced and inspired leadership usually can be equated with nothing more than the discipline imposed by demanding hard work.

On closer analysis the "lucky" communities turn out to be those who have made priority decisions. They have, in their industrial development programs, decided what to concentrate on and what to abandon. They have placed emphasis on what to do rather than on how to do it. In short, they have become opportunity-focused rather than problem-focused. Implicit in these actions is the allocation of scarce resources--people, money and time--to results.

If Appalachia is to move faster economically, if more of its communities are to be successful in attracting favorable attention from industry, there must be similar allocation of scarce resources to industrial development opportunities rather than "problems". In short, the Federal Government, the 12 Appalachian States and their communities are at a fork in the road to industrial development where the basic and correct choice is what public actions and policies to adopt--not how to do them.

Farther down the road there is, for the theoretical economist at least, a sumptuous menu of choices and a superabundance of calories, all of which in one way or another can nourish the industrial outlook of the region. For the plant location analyst, however, the needs of the region narrow down to a dietary intake which will give more Appalachian communities the glow of health that catches the eye of the site-seeking businessman.

In what follows the significance which the location analyst attaches to each dietary item is given explicit meaning and formulation as a series of recommended actions and policies. The first five series of recommendations have been assigned the highest priorities. These actions and policies are crucial. Other recommended actions which follow in sequence cannot be assigned equally precise orders of priority. They comprise, however, the elements necessary to balance out the total industrial development effort.

Priority No. 1

MANPOWER DEVELOPMENT

Academic Education and Manpower Training Programs

The literature in economic growth policies abounds in declarations about the need to train and retrain manpower for occupations of the future. Too much emphasis on preparation for the frontier occupations, however, takes attention away from the lengthening agenda of everyday recruiting problems faced by industry when it starts up new operations in Appalachia.

In selecting Appalachian locations, the mere existence of vocational and technical training programs is less a compelling consideration in the decision-making process than local or area quick-start capabilities for providing personnel, equipment and services critically needed in the anxious first months of breaking in a plant. As a competitive reality, the burden of proof is on the community to demonstrate that there is present responsiveness of a kind geared to minimizing start-up risks and costs.

At the local level--and indeed often at state levels--in Appalachia there is faulty understanding of the essential differences between furnishing down-to-earth manpower assistance during start-up operations and providing programs which assure a reliable supply of salable skills for support and social satisfaction of already established industry.

This faulty understanding stems from a belief that the large corporation, usually the one most closely identified with locational activity, trains its own people and therefore needs only assurances (no matter how generalized) that the local labor market can provide numbers of people believed to be trainable. In the tradition of the national economy, intermediate and higher work skills have indeed been created in the factory or office.

Two fallacies underlie this belief, however. One is the fact that over the past decade the burden of training the unskilled and teaching intermediate skills has been shifting from business to government. This shift is understandable and even inevitable in an expanding economy which demands an unprecedented number of new facilities, and imposes new strains on managerial capability.

A second fallacy is failure to recognize that in Appalachia, as elsewhere, the relatively small business is the one which provides the largest number of work opportunities--and the one which now, as in the past, is most in need of outside training aids. For all their importance, particularly in manufacturing, the nation's very largest corporations carry on their payrolls only three out of ten nonagricultural (and nongovernmental) wage and salary earners (see below):

	Employees (000): 1964
500 largest U.S. industrial corporations	10,464
50 largest commercial banks	218
50 largest life insurance companies	283
50 largest merchandising firms	1,481
50 largest transportation companies	834
50 largest utilities	978
Total employment of above	14,258
Total U.S. nonagricultural employment (excluding government)	48,686
Large corporation employment, percent of U.S. nonagricultural employment	29.4%

Sources: The Fortune Directory of the 500 Largest
U.S. Industrial Corporations
Manpower Report of the President
Standard & Poor's Register of Corporations
Dun & Bradstreet's Million Dollar Directory

Both observations--the need for quick-start manpower training programs and public acceptance of economic responsibility for teaching intermediate skills--accurately reflect the thinking of industry with recent locational experience in Appalachia. Moreover, many of these industrial newcomers, plus perhaps an even larger number of location-seeking businessmen who have chosen to wait out further developments before venturing into Appalachia, will be more encouraged to locate in the region if they see greater progress in combating illiteracy and upgrading academic education.

The latest evidence to attract business attention comes in the form of newly released Department of Defense data which show that in Appalachia, as elsewhere, there is an alarmingly close correlation between most generally accepted measures of state educational performance and results from the Armed Forces Qualification Test (AFQT), which the Armed Forces use in connection with personnel assignment as well as in acceptance of draftees and enlistees. Rejection rates for young men from the 12 Appalachian states, based on the largest and most homogeneous population studied so far, are given below:

Draftee failures on Armed Forces
mental tests (by percent)

Armed Forces mental test
failures, 18-year-olds:
June 1964-December 1965
study (by percent)

	<u>Aug.1958- Dec.1965</u>		<u>1965</u>
U.S. AVERAGE	23.4	20.2	25.3
South Carolina	53.2	48.2	54.6
North Carolina	42.5	41.1	53.0
Alabama	42.3	38.5	44.5
Georgia	41.3	41.2	43.2
Tennessee	36.3	31.8	49.0
Virginia	33.8	28.9	45.3
Kentucky	33.5	26.5	39.1
West Virginia	31.3	27.8	35.5
Maryland	27.1	24.1	27.8
New York	24.4	20.4	24.9
Pennsylvania	15.5	13.9	13.7
Ohio	14.7	14.0	13.9

"In general," says a report from the Surgeon General of the Army, "there is a positive correlation between AFQT scores and education. The youth's score on the AFQT depends on several factors: on the level of his educational attainment, on the quality of his education (quality of his school facilities), and on the knowledge he gained from his educational training otherwise, in and outside of school. There are interrelated factors, which vary with the youth's socio-economic and cultural environment, in addition to his innate ability to learn."

Viewed in this context, the doubts which industry expresses for the manpower outlook in Appalachia can be likened to the economic questions which the engineer asks for electric power service: is it competitive in cost?; is continuity of supply reliable?; is the system capable of adjusting to new and sometimes unforeseeable demands?

In taking this economic view of education, the businessman finds himself in close agreement with nationally prominent spokesman Caudill for the Cumberland Plateau in Kentucky and economist Denison, who documents a strong case showing that increased education is not only one of the largest sources of past and prospective economic growth, but one of the elements most subject to conscious social decision. Denison demonstrates that adding one and one-half years to the time that will be spent in school by everyone completing school between now and 1980 would be three

times more important for national growth than shifting to other uses the resources that are going into "unwanted or little wanted farm products."

If the Appalachian States are to dispel the misgivings and reservations of location-seeking businessmen, if the region is to exploit what, statistically at least, is its greatest resource for new industry (unused manpower), then it becomes abundantly clear that education should be given number one priority in any program to make more communities in the region more attractive to industry.

Relatively little can be accomplished at the community level without the benefit of bold steps by the states. Accordingly, we recommend that the states give priority to programs for strengthening their educational resources. From the standpoint of the location-seeking businessman, the following principles should govern:

General Education

(a) Continued upgrading of community colleges with emphasis on area technical institutes of junior college status. If experience is any criterion, industry is partial to the junior college or the area technical institute with junior college status. Businessmen base this belief on the conviction that (1) the junior or community college is consistent with long-term objectives for improving academic education, (2) students in vocational or technical training at such colleges enjoy the same prestige as four-year college-bound students, (3) these institutions are more likely to retain the best manpower resources in an area for at least a year or two longer, (4) technical training programs are never frozen in content but are adjusted to the changing needs of industry and (5) there is flexibility on a large scale for setting up additional programs that may be needed to provide trained manpower for new industry.

(b) Establishment of business advisory committees functioning at the secondary school level of education.

(c) The promotion and implementation of innovative instruction programs with built-in provisions for evaluation.

(d) Systematic and uniform measurement of what children actually learn and when and how well they learn it.

Vocational Education

(a) Development of capabilities for activating quick-start manpower training programs. In principle, this idea of the mobile training program brought to the community where a new industry is starting up is not new. It has been used for years in training and staffing sewing and footwear operations. Extensions of the concept to any type of industry and its local application under state auspices is a relatively new development. One form of the quick-start program, utilized by South Carolina, embraces the following key elements:

- (1) A state committee for technical education composed of experienced industrial engineers, educators, methods analysts, recruiters, and other industrially oriented staff.
- (2) A rather large equipment pool which can be moved from location to location for equipping special schools in the community where a new industry is starting up.
- (3) Temporary training quarters supplied by the community.
- (4) Surveying the labor market, recruiting, screening and testing of applicants.
- (5) Assignment of teaching personnel and methods engineers to the temporary school.

Added features designed to make the overall plan attractive to industry are close liaison with both the home plant and local management of the industrial newcomer, undivided responsibility, and lack of red tape.

It is obvious from the foregoing that the quick-start type of training cannot and should not substitute for more balanced vocational education having the aims of achieving continuous upgrading of manpower capabilities. It is equally obvious, from the viewpoint of the location-seeking businessman, that quick-start training supplies what, all too often, is lacking in conventional vocational education--tailor-made help, provided when it is most critically needed by the manufacturer: the staffing and start-up period for a new plant. Adding further appeal for the industrialist is relief from cumbersome procedures, such as applying for grants, allotments, multiagency approvals and, not least of all, joint community and state involvement in seeing that all goes well.

(b) Generating business incentives for in-plant training at established plants. As pointed out earlier, the burden of training the unskilled and intermediate skills has been shifting from business to government. No reversal of that trend can be anticipated, particularly in the location of new industry. There are good reasons to believe, however, that the force of this trend can be diminished, if not halted, with provision of suitable incentives that would make it financially attractive for expanding industry to shoulder a greater burden of in-plant training. This idea has taken tangible form in proposals for tax credits, advanced by First National City Bank of New York, among others. Granting a tax credit on business investment in the training and retraining of workers would create a more mobile and flexible labor force, raise productivity, ease skill shortages, and slow down wage escalation among workers in short supply, according to Citibank.

Obviously, metropolitan areas and urban centers in Appalachia would be the ones to benefit directly from such measures. Over the long run, however, benefits could be expected to filter out to the rural areas, particularly those within the labor sheds of the cities, by raising future productivity of commuting workers, who then would be more employable by new industries which might locate in the home communities of such workers.

Two observations should be given weight in these recommendations. One is that ultimate success in vocational and technical training efforts is inextricably bound up in achieving an overall level of excellence in the educational system. The second is that policies which encourage superior education are likely to have greater effect on enhancing community environment than any other single policy which might be adopted in Appalachia.

(c) Greater use of industry-oriented advice (experienced industrial engineers, methods analysts and recruiters) in state bodies administering vocational, industrial and technical education programs. States making effective use of this principle include South Carolina (State Committee for Technical Education) and Pennsylvania (Governor's Committee on Education and the new Council on Higher Education).

(d) Preparation of uniform directories of occupation-centered curriculums in each state. The uniform directory can be not only an aid to the prospective employer but also a diagnostic tool to pinpoint the balance of training effort with evolving industry requirements in the area.

Providing Better Local Labor Market Information

On the basis of its industry mix and underemployment, Appalachia as a region undoubtedly has a larger reserve of unused manpower than any other region in the nation. Undeniably, this observation has statistical significance and socio-economic import. Unfortunately, it carries with it little practical meaning for businessmen, who do not locate plants in regions but in communities which can provide employable manpower.

Intraregional differences in labor supply and costs turn out, more often than not, to be greater than interregional factors. The site selection process always must get down to making precise comparisons of individual labor markets, taking into account the following factors, among others:

- (1) Population size, age profile, and education
- (2) Labor force size
- (3) Industrial base and employment
- (4) Industrialization trends
- (5) Recent expansion programs
- (6) Wage patterns
- (7) Fringe benefits
- (8) Turnover
- (9) Absenteeism
- (10) Commuting patterns
- (11) Employer and employee attitudes
- (12) Union leadership
- (13) Extent of incentive-rated jobs
- (14) Seasonal operations
- (15) Use of part-time workers
- (16) Output and quality of vocational schools
- (17) Output of high schools
- (18) Personal income and spending patterns
- (19) Response to shift work
- (20) Influence of surrounding labor markets

Some of these factors lend themselves to precise measurement. Others do not, but their probable effects on new industry coming to town can be gauged fairly accurately, nonetheless. Measurements and evaluations can be made only after intensive investigation by the site-seeking businessman or his location consultant. The screening process, however, frequently starts from an examination of information already available in published form.

Reasonably good, comparable employment and earnings information is available over various spans of years for 16 metropolitan areas in Appalachia. From the simplified tabulation given on the following page, it can be seen that these metropolitan areas range

in size of nonagricultural employment from 37,000 to 828,000, in manufacturing employment from 14,600 to 299,600, and in average hourly earnings of manufacturing production workers from \$1.98 to \$3.29.

Labor market area designation	Counties included	Employment 1964 (000)		Average hourly earnings 8/66
		Nonag.	Mfg.	
Altoona, Pa.	Blair	44.5	14.6	\$2.29
Binghamton, N.Y.	Broome	101.7	47.4	2.58
Birmingham, Ala.	Jefferson	220.5	66.4	2.93
Charleston, W.Va.	Kanawha	83.6	22.6	3.29
Chattanooga, Tenn.-Ga.	Hamilton, Tenn.	118.0	50.7	2.38
	Walker, Ga.			
Elmira, N.Y.	Chemung	37.0	16.6	2.73
Erie, Pa.	Erie	89.9	43.7	2.81
Greenville, S.C.	Greenville	104.8	53.1	1.98
Huntington-Ashland, W.Va.-Ky.-Ohio	Cabell, W.Va.	79.2	27.6	3.07
	Wayne, W.Va.			
	Boyd, Ky.			
	Lawrence, Ohio			
Johnstown, Pa.	Cambria	76.2	27.5	2.90
	Somerset			
Knoxville, Tenn.	Anderson	135.7	47.8	2.44
	Blount			
	Knox			
Pittsburgh, Pa.	Allegheny	827.8	299.6	3.23
	Washington			
	Westmoreland			
Scranton, Pa.	Lackawanna	81.9	34.6	2.14
Wheeling, W.Va.-Ohio	Marshall, W.Va.	56.4	16.8	2.87
	Ohio, W.Va.			
	Belmont, Ohio			
Winston-Salem, N.C.	Forsyth	N.A.	38.8	N.A.
Wilkes-Barre - Hazleton, Pa.	Luzerne	114.2	52.2	2.09

The above labor markets embrace a total of 27 counties out of a total of 373 counties in all Appalachia. For the 346 counties not regularly reported in Employment and Earnings, issued by the U.S. Department of Labor, there are other sources of information of one kind or another. These include individual state publications, employment security statistics, County Business Patterns, and various types of local data.

This information, where it is readily accessible and available (as is often not the case), has a much lower level of utility. It suffers from incompleteness, lack of continuity, non-comparability, and other defects. It places immediate obstacles in the path of location-seeking executives undertaking realistic comparisons of labor market factors in rural and small urban areas of Appalachia. In short, regional statistical surpluses of labor and presumed wage advantages of Appalachia cannot now be given local focus without detailed investigation on the spot. And often there are no incentives for making these field investigations without some prima facie evidence that they will be economically justifiable.

These observations can be summed up by saying that the most basic of all plant location needs, regardless of the type of industry, is reliable, up-to-date local labor market information, readily accessible. Despite public announcements or declarations to the contrary, much of the industrial development in rural and small urban areas throughout the country has been the result of a search for improved labor conditions. Manufacturers have attempted to reduce labor costs, improve labor conditions, and avoid restrictive union practices.

While there may be no valid reasons for questioning the quantitative supply of labor, there are indications that mere numbers of people in rural and small urban areas of Appalachia are less meaningful than in other regions. For a number of reasons, including educational level, commuting problems in the mountains, machine adaptability, and even social attitudes, it would appear that greater selectivity would be needed in Appalachian areas than in many others. What this means is that a higher ratio of applicants per job opening is probably required.

Given the fact that many large parts of Appalachia cannot demonstrate the availability of employable manpower in terms that are satisfactory to the industrialist, the question arises as to what the Federal Government, the states, and local groups can do to meet present and future needs. A second question concerns what priority should be assigned such actions.

We recommend the following:

(a) Action by the Bureau of Employment Security in each state to make available to the U.S. Department of Labor data for smaller labor markets for inclusion in Employment and Earnings. We propose that coverage include employment and earnings data for the following new small labor market areas:

Alabama

Anniston (Calhoun County)
Florence-Sheffield-Tuscumbia-Muscle Shoals (Colbert
and Lauderdale Counties)
Huntsville SMSA (Limestone and Madison Counties)

Georgia

Rome (Floyd County)
Gainesville (Hall County)
Dalton (Whitfield County)

Kentucky

Middlesboro (Bell County)
Corbin-London (Knox and Laurel Counties)
Pulaski (Somerset County)
Winchester (Clark County)

Maryland

Cumberland-Hagerstown (Allegany and Washington
Counties)

New York

None

North Carolina

Asheville (Buncombe County)
Lenoir (Caldwell County)
Winston-Salem (Forsyth County)

Ohio

Steubenville-Weirton SMSA (Jefferson County in Ohio)
Chillicothe (Ross County)
Portsmouth (Scioto County)

Pennsylvania

Johnsonburg-St. Marys (Elk County)
Sunbury (Northumberland County)
Williamsport (Lycoming County)

South Carolina

Anderson (Anderson County)
Spartanburg (Spartanburg County)

Tennessee

Elizabethtown-Johnson City (Washington and Carter
Counties)
Kingsport-Bristol, Tenn.-Va. (Sullivan County in
Tennessee)
McMinnville (Warren County)

Virginia

Covington (Alleghany)

Pulaski-Radford (Pulaski City, Radford City, and Pulaski County)

Kingsport-Bristol, Tenn.-Va. (Bristol City and Washington County in Virginia)

West Virginia

Steubenville-Weirton, Ohio-W.Va. (Brooke County in W.Va.)

Clarksburg (Harrison County)

Parkersburg (Wood County)

Obviously, all small labor market areas in Appalachia cannot be covered. Those proposed, however, fill in many yawning gaps on the Appalachian map and provide a sizable number of benchmarks for economically active counties from which smaller surrounding counties can be surveyed as needed.

The usual arguments against small labor market coverage are ones of costs and the fact that political boundaries often cut through homogeneous wage areas, while concealing important wage contrasts within the political unit. The latter observation, of course, has equal validity in metropolitan areas now reported and is therefore not sufficient to rule out smaller areas.

The Bureau of Employment Security, U.S. Department of Labor is actively pursuing a "Smaller Communities Program." However, its utility for the location-seeker is limited, since it is a "one-time" report for individually selected counties and does not include employment, hours, and earnings data.

The proposed program might be regarded by some as being too expensive. The expense is indeed worthwhile, considering the urgency of bringing Appalachia's manpower resources into sharper focus. Employment and Earnings, which is regularly consulted by corporate management in advance of making location decisions, provides one of the best possible mediums for giving this focus praiseworthy exposure.

(b) Development of systematic and uniform state plans for collecting and updating labor resources information on a county basis. Various states issue individual county data books or compendiums. Often much that is extraneous from a labor recruiting point of view is included; often much that is essential is omitted. Some contain standard Census of Population data with 10- and 15-year projections (e.g., Georgia). Still others contain proprietary income and current population estimates (e.g., Sales Management, and Editor & Publisher Market Guide). In a few instances (e.g., Alabama) authoritative employment data for current and earlier years are presented.

Only one Appalachian state, Kentucky, has instituted a systematic program for bringing together in one place enough demographic and socio-economic data from which independent estimates of the recruitable labor supply can be made on either a county or multi-county basis.

The Kentucky program, prepared with consultative help, presents 16 items of population information, some 20 items of labor force and employment data, 12 items of income and spending patterns, and more than 2 dozen items relating to education and student development. All of this information is of sufficient quality to establish a reliable basis for estimating male and female labor supply within certain age brackets, when the county industry mix is given its proper weight.

As an effort supervised by the state, the Kentucky program makes available to the industry and the local community data which are germane to the complex problems of labor market analysis. Initiation of similar programs in other Appalachian states may not be without its problems, however. One is the matter of costs, which may include consultative services for interpretation to remove industry suspicions of local bias. As in the previous recommendation, however, it may be a justifiable expenditure of funds under Appalachian programs to ease burdens on the individual states.

Other problems involve ones of judgment--what to add or what to leave out. Various local groups and some states have in circulation labor "surveys" which purport to show how many people are available for work. Local feelings that these are adequate are not shared by industry. Furthermore, such local surveys seldom contain information that is useful for other decision-making processes, particularly those affecting vocational education.

Viewed in all of its ramifications for the location decision, it can be seen that providing better labor market information is a task closely interrelated with programs we have advanced for academic education and manpower training. On this basis we assign it equal priority--number one.

(c) Machinery to provide realistic labor market information. One of the tenets of the Vocational Education Act of 1963 is that there should be cooperative agreements between vocational education agencies and public employment agencies. This proviso was written into the Act to insure that consideration is given to available labor market data and that there will be effective coordination of the counseling services offered by schools and employment services. Praiseworthy as this objective may be, there are good reasons for believing that most vocational educators in

the Appalachian States are limping along with a bare minimum of labor market information and much of it outdated at that. One of the biggest gaps that needs closing is effective communication between school systems, employment security departments, and state industrial development agencies. At the most elementary level, this gap points up a need for record keeping by school superintendents which will quickly make available to others such basic information as the graduate output of high schools, follow-up records of the graduating class, numbers of high school dropouts, and so on.

To plug this gap, Kentucky's Department of Commerce has developed machinery for supplying on a county basis uniform and continuing information on high school enrollments (grades 10 to 12), the number of male and female high school graduates, plus the status of male and female graduates in each of the following receiving categories: college or university; trade, technical or nursing school; commercial schools; sales and office employment; farming employment; factory or trade employment; other employment, including military; at home; and unknown.

Those who have had first-hand experience in trying to assemble similar information for small labor market areas in other parts of Appalachia will recognize the innovative value of this system, not only to vocational counselors but also to the location-seeking businessman with a need to gauge the dynamics of local labor market strength beyond the shallow depths of conventional labor force statistics.

Priority No. 2

TRANSPORTATION

Introduction

There is more than a grain of truth in the belief that changes in industrial output and in location appear to alter the structure of transportation, rather than the converse. Indeed, certain types of plant location site selections in rural areas can be made with the presumption that both the required quantity and quality of transportation services, as well as the necessary rate structures, will develop or will be created in prompt response to shipper demand.

All too often, however, this presumption cannot be made. This is particularly true for industries which require so-called premium service involving frequent movement of goods in small lots, with short door-to-door delivery time, with a high predictability of arrival time, plus the requirement of minimum handling, low levels of loss and damage. In such cases, site selection usually must narrow down to a small handful of carefully chosen urban areas.

Between these two extremes there is a twilight zone in which it may be possible to compromise transportation objectives without sacrificing other locational advantages that may be available. The possibilities for such compromise depend in part on the nature and size of the industry, as well as the company and community involved. There are also the broader and more basic considerations of regulatory problems, the realities of intercarrier and intermodal competition plus, of course, regional geography and infrastructure.

In its 1964 report to the President, the Appalachian Regional Commission did not accept the proposition that the flow of goods to and through remote areas must take an evolutionary course in response to the gradual development of industry within the region. Instead, the Commission recommended that such areas be given capabilities for meeting the needs of industry through the construction of development highway systems and other roads, airport improvements, etc.

This recommendation for road construction has since been given the highest priority and the largest allocation of funds (\$840 million over 6 years) under Section 201 of the Appalachian Act. The next priority that must now be considered is the infinitely more complex one of building upon this infrastructure (and in other cases grafting to it) a structure of transportation and policy guidelines which can supply existing industry (and demonstrate to location-seeking industry) the distribution services that are needed.

This undertaking involves (1) identification of specific industry requirements, (2) removal of impediments to satisfying these requirements, and (3) coordination of actions, including regulatory policies which will generate incentives for transportation carriers to make maximum use of the infrastructure now being created. Perspectives on the first of these three considerations are supplied by each of the individual Appalachian Industrial Location Studies.

The remaining two considerations cut across industry boundaries and must be dealt with on the level of policies and actions that are, for the most part, regional in scope. The following recommendations, presented as individual items, must therefore be regarded as interrelated actions and policies to be pursued as a total effort to increase the attractions of the region in the eyes of carriers which supply transportation and in the minds of businessmen who purchase transportation services.

This total effort should have priority only second to the first priority assigned to "Manpower Development."

Motor Carrier Service

Contrary to public opinion, the construction of new and better highways does not automatically bring additional trucking services to shippers in the affected areas. Several formidable obstacles must be surmounted before this service can become a reality.

One of the more basic problems concerns the steps necessary to modify the franchise (operating rights) of common carriers. Ordinarily, this requires extensive and expensive litigation with supporting documents before the Interstate Commerce Commission and the courts. In all cases, the burden of proof is upon the applicant to show that service by his competitors does not meet needs of shippers.

For example, Motor Carrier A may propose to extend his authority between certain origins within Appalachia and destinations outside Appalachia. This petition may be opposed by Motor Carrier B supported, in turn, by Motor Carrier C, and perhaps Railroad X. Carrier A must demonstrate that B, C, and X cannot perform this service. It is not difficult for the three opposition carriers to block the petition by contending they can perform the service, given the traffic, even though they may have little or no interest in doing so.

The shipper, or prospective shipper, is caught in a dilemma involving a regulatory problem on the one hand and competitive infighting on the other hand. The latter, in turn, may have as its entrants two or more common carriers, a common carrier, and a contract carrier, or two or more modes of transportation (e.g., water, rail, or truck). As a result, the number of extensions made is very limited and many situations tend to remain frozen in areas needing the most help.

A more favorable outlook is encountered for certain contract carrier petitions, particularly where the basis for petition concerns providing special equipment (certain van sizes or tank trucks of a specialized nature) for hauling a specified commodity between two points. Rights granted in such cases, however, are limited only to the specific request.

As matters now stand, smaller communities can exert little or no influence in solving this everyday problem of plant location. Only the very largest chambers of commerce have sufficient resources to employ the services of transportation specialists licensed to practice before the Interstate Commerce Commission and prepared to argue public convenience and necessity.

Smaller communities are also caught in a problem of another kind. This concerns non-use of operating certificates by a number of carriers. This non-use, or infrequent use, is rather common in areas deemed unprofitable because of the low frequency of traffic generated. Very often such areas, containing otherwise desirable small communities, will be bypassed by site-seeking businessmen because the certificated carriers do not (a) openly solicit business in the area, or (b) rely on a local cartage agent who specializes in service to a few towns on behalf of several long-haul carriers operating out of a central city.

Carriers who have the operating authority to serve a particular area but use agents to perform the service for them usually keep the legal title from becoming dormant by performing an isolated pickup or delivery once or twice a year.

It matters not that there are cases where manufacturers who have offered all inbound and outbound traffic to a single carrier have been known to activate as much as 125 miles of additional direct routes within Appalachia. These cases tend to be the exception and, in any event, the potential for this fortuitous combination of factors is seldom something that can be conveyed by the small community to the industrial prospect while a location project is still in the screening stage.

Grandfather operating rights issued to motor common carriers in 1935 have since been divided, sold, and consolidated much like real estate. Carriers are more than willing to provide regular service within their operating rights where the traffic justifies. Table 1 gives a good testimony of this by the number of carriers offering their services to the major population centers of New York, Chicago, Detroit, Atlanta, Pittsburgh, and Charlotte. Further consolidation of operating rights seems inevitable when industrialization expands into areas now considered unprofitable for direct carrier operation. The crucial questions concern timing.

Highway Development

The planning and design of Appalachian road corridors recognizes that better highways can expedite traffic movements for existing motor carriers serving industry within the region. It is therefore all the more important to forge first those links in the chain that will give the more remote, less developed areas of the region more direct access to major market cities outside the region, namely, New York, Chicago, Detroit, Philadelphia, Baltimore, Washington, Richmond, Charlotte, Atlanta, Louisville, and Columbus.

Secondary emphasis should be placed on those highways which move people and goods within the region. Important as these internal movements may be for tourism and labor mobility, it should be remembered that intraregional highways will be of secondary importance in winning for the region favorable attention from industrial prospects.

From this vantage point, the most beneficial highways can be viewed as tributary streams to industrial basins which surround Appalachia. Accordingly, major portions of development highway corridors and construction projects approved by the Appalachian Regional Commission should be completed as quickly as possible.

The secondary highways listed for priority contain a total of approximately 1,000 miles of the 2,224 miles already approved by ARC as of July 14, 1965. In addition, the priority list contains nearly 450 miles of interstate highway construction.

One competitive disadvantage of Appalachia may persist for some time even after the new highways shorten distances between points. This drawback concerns motor carrier rates, which tend to be constructed and pegged on rail mileages.

In any event, it appears obvious that construction of better highways will not close all competitive transportation gaps which now separate many Appalachian communities from various key cities on the fringe of the region.

Providing Incentives for Motor Carriers to Use Appalachian Highways

There is a broad range of weight limitations within the 12 Appalachian States as shown by the figures in Table 2. Studies by highway engineers and the motor carrier industry have demonstrated that deterioration of a standardized road is in relation to the bearing of each vehicle axle on the road surface.

Recent legislation in Pennsylvania, following recommendations in these test studies, has raised the single axle limitations to 22,400 pounds and to 36,000 pounds for tandem axles. Maximum gross weights were set at 71,145 pounds.

In some states, scales are manned 24 hours a day to enforce their weight laws. It is usually the state with the lowest limits that must bear the burden of weighing interstate traffic between major population centers. The long-haul truck traffic that passes through this one low-limit state is thus restricted in load factors for each of the other states through which the vehicle passes. Obviously, freight cannot be loaded and unloaded at state lines to meet the specific requirements of each state. As an example of this condition, east-south interstate traffic is weighed in Virginia. Other states bordering Virginia open their highway scales only occasionally to check interstate traffic and traffic that may not have passed through Virginia.

State limits on motor carrier dimensions are fairly uniform, as can be readily seen in Table 2. Only the states of Tennessee and Virginia have total vehicular lengths established below 55 feet.

The use of double-bottom trailers in motor transportation is presently very limited. Ohio, Maryland, and Georgia are the only Appalachian states permitting this type of operation on prescribed highways. The Massachusetts Turnpike Authority has written a rigid safety code for drivers and equipment that has established a 5-year experience record that might be used as a model for the joint action of Appalachian States. Ohio and Massachusetts Turnpikes, with grades less than 3 percent and broad lanes, have demonstrated an enviable safety record. Exit terminals have been built to switch units from double- to single-bottom units that continue on other highways.

A variety of use taxes currently are levied on motor carriers. Differing procedures are found in different states and create a large accounting burden on interstate carriers. Large operations can handle the complex task on automated equipment. Small carriers cannot afford this benefit. Significantly, it is the latter category which holds the greatest potential for improved service in Appalachia.

Recommendations

(a) It is recommended that the Appalachian Regional Commission's highway program be completed as quickly as possible.

(b) Provision for an additional highway connecting Williamsport and Harrisburg in Pennsylvania. (The existing route is U.S. 15.)

(c) Enactment of legislation by the states to achieve uniformity of:

- (1) regulations governing weight limits (axle and gross) for motor carriers and for rail carriers;
- (2) use taxes on motor carriers, based either on mileage or fuel purchased;
- (3) construction or use standards pertaining to clearances and loads on all new projects for highways, bridges, rail lines, air cargo carriers, and waterways.

Suggested standards are as follows:

HIGHWAYS	<u>Width (feet)</u>	<u>Height (feet)</u>	<u>Length (feet)</u>	<u>Axles</u>	<u>Maximum Gross Limits (lbs.)</u>
<u>Lane Clearances:</u>					
Present Average	14	13.5	40	4	70,525
Suggested	15	15.5	40	5	73,280
<u>Trailers:</u>					
Present Average	8	13.5	40	1	22,400
				2	40,000
				3	67,200
				4	73,280
				5	73,280

(d) Enactment of legislation by the states to facilitate uniform use and regulation of double-bottom truck trailer units on interstate routes and major corridor highways that have compatible grades and lane construction.

(e) Leasing of land to motor carriers to facilitate switching from double- to single-bottom truck trailer units at major exits from interstate and major corridor highways. (This program might operate under partnership of the Federal Government and the individual states.)

(f) Collective action on the part of the ARC and the 12 Appalachian States to foster improvement of motor carrier service throughout the region. Principles to be espoused should include the following:

- (1) place before the newly organized Federal Department of Transportation all appropriate information that will aid in the formulation of policies consistent with the development of better transportation capabilities to and from the region;
- (2) end-to-end mergers of carrier operating authorities that will provide single-carrier through service and reduce handling of cargo;
- (3) expedite, through the Interstate Commerce Commission, applications of motor carriers for extensions of operating rights;
- (4) joint rates between various modes of transportation (e.g., highway rail) that take advantage of the inherent advantages of each;
- (5) continuing competition between carriers with parallel operating authority where the volume of traffic is sufficient to justify dual overhead costs.

Table 1.

State Maximum Limits for Typical Motor Carrier Vehicles

State	Dimensional Limitations				
	Height	Width	Semi-trailer	Length (feet)	
				Tractor semi-trailer	Tractor semitrailer and full trailer (double-bottom)
Alabama	13' 6"	96"	NS	55	NP
Georgia	13' 6"	96"	NS	55	35
Kentucky	13' 6"	96"	NS	55	NP
Maryland	13' 6"	96"	NS	55	55
New York	13' 6"	96"	NS	55	NP
North Carolina	13' 6"	96"	NS	55	NP
Ohio	13' 6"	96"	40	55	60
Pennsylvania	13' 6"	96"	40	55	NP
South Carolina	13' 6"	96"	NS	55	NP
Tennessee	13' 6"	96"	NS	50	NP
Virginia	13' 6"	96"	NS	55	NP
West Virginia	12' 6"	96"	NS	50-55(2)	NP
	to 13' 6" (2)				

State	Weight Limitations (gross weight in pounds)		
	Axle Load Limits		5-Axle Tractor Semitrailer
	Single Axle	Tandem Axle(1)	Practical Maximum Gross Weight
Alabama	18,000	36,000	73,280
Georgia	20,340	40,680	73,280
Kentucky	18,000	32,000(2)	73,280(2)
Maryland	22,400	40,000	73,280
New York	22,400	36,000	71,000
North Carolina	18,000	36,000	70,000
Ohio	19,000	24,000	72,000
Pennsylvania	22,400	36,000	71,145
South Carolina	20,000	36,000	65,000
Tennessee	18,000	32,000	73,280
Virginia	18,000	32,000	70,000
West Virginia	18,000	32,000	60,800

NOTES:

(1) Axles spaced 4 feet apart (2) Permitted on designated highways

NS - Not restricted as to stated limits of combinations

NP - Not permitted

SOURCE: State Motor Carrier Guide (Commerce Clearinghouse), Nov. 1965

Table 2.

Number of Motor Common Carriers Providing Single-Line Service
Between Selected Appalachian Points and Major Markets 1/

	New York, N. Y.	Chicago, Ill.	Detroit, Mich.	Charlotte, N. C.	Atlanta, Ga.
Binghamton, N.Y.	18	6	3	2	2
Erie, Pa.	13	12	11	3	2
Scranton, Pa.	22	7	5	7	6
Wilkes Barre - Hazleton, Pa.	19	7	6	6	5
Altoona, Pa.	11	7	2	None	None
Johnstown, Pa.	16	7	4	3	None
Pittsburgh, Pa.	24	22	16	6	6
Steubenville, Ohio- Weirton, W.Va.	13	15	10	2	2
Portsmouth, Ohio	3	4	4	3	1
Hagerstown, Md.	10	6	3	2	1
Wheeling, W.Va.	9	7	5	2	1
Charleston, W.Va.	8	6	4	4	4
Huntington, W.Va. - Ashland, Ky.	5	6	4	3	2
Bristol, Va.	6	2	2	6	3
London, Ky. - Corbin, Ky.	1	2	None	1	2
Winston-Salem, N.C.	21	6	3	22	13
Asheville, N.C.	13	6	5	16	13
Knoxville, Tenn.	6	4	2	8	9
Greenville, S.C.	19	6	4	20	15
Rome, Ga.	6	4	1	5	4
Huntsville, Ala.	5	6	2	3	5
Gadsden, Ala.	3	3	2	3	6
Birmingham, Ala.	5	8	3	5	13
Tuscaloosa, Ala.	2	4	1	1	5

Table 2 - cont'd

Number of Motor Common Carriers Providing Single-Line Service
Between Selected Appalachian Points and Major Markets 1/

NOTES:

- 1/ Figures based on motor common carriers of general commodities who advertise or otherwise hold themselves out to furnish such service. Does not include common carriers who hold authority to render such service but do not service for various reasons.
 - 2/ SOURCE: Motor Carrier Directories and Tariffs for the Middle Atlantic Conference, Eastern and Central Motor Carriers Association, Central and Southern Motor Freight Tariff Association, and Southern Motor Carriers Rate Conference.
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Rail, Water, and Air Service

The flexibility of motor carrier service makes it the prime area for immediate transportation service improvements within Appalachia. Nonetheless, a review of the individual industry studies demonstrates a heavy reliance on rail service. Moreover, even when faced with little or no immediate use, the prudent location-seeker will prefer the site with a rail siding, thus enhancing the property's utility and salability while providing an alternate mode of transportation.

Water and air service provide a slightly different story. In most cases, air transportation is important as a passenger vehicle for liaison or customer service. Proximity to such service is somewhat flexible and can be subject to trade off. However, waterway transportation usually appears as a primary locational factor for those specific industries which must move large quantities of bulk materials.

Rail Carrier Development

Rail carriers are prohibited from quoting unpublished rates on exempt agricultural commodities. Traffic of this nature is frequently lost to water or motor carriers which can, by law, quote any rate on a day-to-day basis as their operating capacity allows.

Although many water and motor carriers publish rates on exempt commodities, they often quote lower rates to alleviate out-of-balance operating conditions. Traffic returning only enough revenue to cover operating expenses is often accepted by water or motor carriers to minimize the loss of returning empty units.

More and more railroad volume commodity rates are being based on the cost per car rather than the cost per ton. Larger cars are allowing higher minimum weights in rate making. Car capacity rules restrict and burden some bulk receivers who have not attuned their storage capacities to larger shipments.

Railroad rights of way are necessarily limited by topography and grade. Circuitous routes, some laid out more than a century ago, create undue transit limitations on curves and grades when modern engineering capabilities are taken into account.

Railroad rights of way have a variety of roadbed weight limitations and structural clearances that tend to inhibit the access of large-volume cars and commodities common to major industrial plant equipment. Old bridges and tunnels restrict the passage of transformers, steam generator vessels, presses, and heat transfer equipment commonly installed in power plants and heavy industrial plants. "Daylighting," or blowing off the tops of tunnels is costly to the rail carriers. Lowering track levels in tunnels weakens walls and has been abandoned as an alternative to increase clearances.

Roadbed limitations are not uniform. Gross weights for 4-axle rail cars range from 200,000 pounds per car to 263,000 pounds.

In cases where two or more carriers serve a city, joint area switching limits are often established, permitting the free interchange of cars and power equipment within specified limits.

Where heavy traffic prevails, parallel rail lines often join several major cities. Operations of switching, control, and line haul are duplicated. Management and executive overhead is also duplicated in many areas where single authority might perform the same capacity.

Prominent among other conditions which might be corrected are those where the operating lines of two or more rail carriers converge on abandoned coal mine areas, such as those in eastern Kentucky, yet do not join each other at these points. Circuitous routing develops for some traffic that might otherwise enjoy joint line hauls.

Large electronically controlled rail classification yards are now capable of putting together trains for more rapid dispatch. The fewer the number of such rail heads a through car must pass, the faster service it receives.

Rail transportation is generally restricted to volume traffic with more and more restrictions being placed on LCL (less than carload) shipments.

Some railroads jointly own carloading companies who perform LCL service. Carloaders do not operate extensively within Appalachia. Carloaders tend to operate coast to coast, or at least between the major industrial centers like New York and Chicago. Generally, transportation policies within Appalachia would have very limited effect on carloading companies and their service rendered the shipping public.

Maximizing Water Transportation Potentials

Construction of inland waterways, such as those in the Tennessee River, has opened industrialization in areas where only marginal benefits were offered plant locations before the waterways opened.

Locks with 100-foot elevation capacities, canals, and channels of 9-foot depth and 60-foot width have opened inland areas to bulk carriage and low rates that encourage industrialization. Plants manufacturing paper, chemicals, primary metals, textile fibers, cement, and power plants, even grain users and heavy industrial raw material suppliers, all benefit from waterborne transportation.

Exempt agricultural commodity rates on grain and fertilizer are conducive to maintaining profitable agriculture. In some Appalachian areas, concentrated protein feeding of livestock is prohibitive because low rates are not maintained on Midwest grain shipments. Low waterborne rates will compel rail carriers to establish rate structures more attractive to these disadvantaged farmers.

Raw materials basic to industry, such as iron ore, bauxite and petroleum, are imported by ocean-going vessels whose draft frequently forces costly cargo discharge and rehandling at ports of Mobile, New Orleans, Norfolk, Philadelphia, and New York. Barge penetration inland extends to the Port of Birmingham, Knoxville, Charleston, West Virginia, and about 30 miles beyond Pittsburgh.

Water transportation is generally the slowest means of transportation at the lowest cost. With the Tombigbee River channel extension into the Tennessee River, further shortcuts inland will divert a larger share of bulk traffic to waterways in southern Appalachia.

Upgrading Air Service

The Federal Aviation Agency designates airport classifications by the type of facilities available. General aviation airports can accommodate private planes, including the smaller models of business aircraft. Commercial airports owned by states, municipalities, or authorities are restricted in use only by physical capacities of runway length, width, and bearing, as well as landing approaches and systems.

Appalachia has few areas that can justify coast-to-coast passenger or freight service. Most commercial airports within Appalachia accommodate either feeder or interregional airlines.

Air carriers with both short-haul and long-haul operating authority are now competing with some of the short-haul, feeder air carriers. In the past year, the economies of short-range jets have made the short-haul traffic very lucrative for long-haul carriers who heretofore have tended to shy from this traffic.

Air carrier load factors are important determinants in the frequency of service they will offer a particular airport. Initial carrier petitions to the C.A.B. for extension of service are based upon the profitability of the operation. Usually a second carrier is extended similar authority if the C.A.B. is petitioned, simply to guarantee competition.

The rough terrain of Appalachia encourages air carriers to fly out of the mountain ranges and over more level land when possible. Trajectory-like flights now possible by short-haul jet aircraft will enhance the access to Appalachia by air transport and provide schedules more acceptable to the businessman.

Runway lengths and weight limitations are still deterrents to air service in many Appalachian communities where there may be traffic to justify a profitable air service. Jet aircraft, in particular, have broadened the requirements for take-offs and landings.

Service for general aviation at many community airports does not include runway lighting, radio contact, or hard-surface runways. Maintenance facilities and hangars are lacking in many airports.

Long-range possibilities for air industrial parks in some communities of Appalachia are feasible. Lack of strong management and substantial financing, plus the cost of extending utilities to airports from distant city centers, inhibit immediate growth potential.

Recommendations

(a) increase the emphasis on completion of waterways programs to foster the further development of competitive rate-making policies on grain, ore, steel, petroleum, cement, and other bulk commodities vital to Appalachia;

(b) secure the maximum cooperation from the Federal Aviation Agency in the provision of additional facilities for general aviation, including radio communications, runway lighting, extended runways, 12-hour tower control operations, and additional maintenance hangars;

(c) encourage joint action by large cities and major manufacturers generating air freight traffic to seek from the trunk airlines increased air freight container service to the population centers of St. Louis, Chicago, New York, and Los Angeles.

Transportation Resources

The Commission, in attempting to resolve the transportation problems of the region and during implementation of the recommendations contained in this report, should not overlook the assistance available from the various private and semiprivate transportation advisory groups. Some of the more prominent groups are contained in the following listing, together with the general classification of membership and the primary objective of the organization:

National Association of Shippers Advisory Boards
Membership: shippers and rail carriers; Purpose:
to monitor national rail transportation policy.

Middle Atlantic Shippers Advisory Board
Membership: shippers and rail carriers; Purpose:
to monitor rail transportation policy in New York,
West Virginia, and Pennsylvania.

Southern Shippers Advisory Board
Membership: shippers and rail carriers; Purpose:
to monitor rail transportation policy in the
remainder of Appalachian States.

Association of American Railroads Research
Consulting Committee and Engineering Division
Membership: rail carriers; Purpose: to develop
lower cost and improved rail service.

National Industrial Traffic League
Membership: shippers; Purpose: to monitor all
carrier cost, service and rate action.

Transportation Association of America
Membership: shippers and carriers; Purpose: to
pass legislation mutually beneficial to shippers
and carriers.

American Paper Institute - Traffic Committee
Membership: paper industry traffic personnel.
Purpose: to initiate rates jointly for paper
industry members.

American Iron and Steel Institute - Traffic
Committee
Membership: steel manufacturers; Purpose: to
initiate rates and policies that will assist the
steel industries.

American Trucking Association
State Laws, Taxation and Reciprocity Division
Membership: motor carriers; Purpose: to promote
uniformity in taxes and regulations.

U.S. Chamber of Commerce - Transportation Dept.
Membership: business firms of all types; Purpose:
to promote transportation legislation that will
benefit business in general.

Priority No. 3

INDUSTRIAL SITE PLANNING

The urgency of this need is underscored by recent population and employment projections for Appalachia. According to the Office of Business Economics in the U.S. Department of Commerce, manufacturing employment in the region will grow at an annual rate of 32,000 jobs between 1960 and 1980. This growth increment, of course, will be the net result of expansion of existing industry and the location of new industry.

What this means in terms of plant sites can be shown by a few simple approximations. Plant location experience over the past five to ten years discloses that industrial newcomers to Appalachia have been acquiring properties which, for initial operations, consume an average of about 15 acres of land per 100 manufacturing workers. Translated into total land consumption, this ratio would indicate an expectable annual demand for about 4,800 acres of industrial real estate in the entire region.

At first glance, this figure appears tiny in a region as vast as Appalachia. Upon more mature consideration, however, it can be seen as posing serious problems if it is considered not as a generally distributed regional demand but as a requirement that must be satisfied by a relatively small number of communities. Further, it is not simply a requirement for quantity but quality as well.

For reasons of labor supply, public facilities, and other factors, towns of 5,000 population or smaller cannot compete on equal footing with communities of 10,000 population or larger. This means that the number of Appalachian communities which can be relatively strong contenders for new industries narrows down to a few hundred at most.

This conclusion is well supported by the present geographical and urban distribution of industry within Appalachia. For example, the major manufacturing corporations in Appalachia have plants in about 450 communities of the region. Many of these communities, however, are suburbs of fairly large urban areas. Thus, the number of active manufacturing locations in Appalachia dwindles to about 300.

The prospect, therefore, is one which will see possibly not more than 300 communities (or community clusters) called upon to supply the aforementioned 4,800 acres of additional industrial real estate each year. This works out to about 18 acres per community--each year. This is, at best, less than one general-purpose industrial site, not a particularly strong competitive position for development people who must face up to the reality that industry usually purchases a property only after looking at an assortment of sites.

Viewed only from this vantage point, the need for more effective land use planning in Appalachia cries out for attention. But there are other needs which pyramid the gravity of the situation. These include public and commercial lands in communities to accommodate normal growth, to provide additional supporting facilities for industrial newcomers, plus soil erosion control, conservation of forest land, reclamation of strip-mined areas, development of recreation areas, and so on. Given the difficult terrain that is typical of many Appalachian communities, these requirements will not be easy to satisfy. In reviewing present programs, there must be decisions concerning what to concentrate on and what to abandon.

The 25 individual Appalachian Industrial Location Studies establish a basis for certain priorities in overall land use planning by Federal, state, and local groups. Primary policies and actions are brought together in the recommendation and rationales which follow. Taken as a group, this series of recommendations merits third position among all priorities contained in this summary report.

(a) It is recommended that state industrial development agencies intensify efforts to guide their communities in the identification of real estate suitable for development as "general-purpose" plant sites of 40 acres or larger. The following basic principles are worthy of consideration:

- (1) The staging of subregional community clinics at regular intervals (semi-annually);
- (2) Sponsoring agencies and groups to include state industrial development and planning departments, transportation carriers, utility area development departments, and state chambers of commerce;
- (3) The ultimate objective should be single ownership or control (by carefully drafted option agreements) of suitable properties.

- (4) Sites must be served by public water and sewers or within proximity of expandable public water and sewers, with explicit agreement that water and/or sewer will be extended to the property line.

Development of new sites, or a general upgrading of site portfolios, will not in itself insure that new industry will come to the average community, much less the marginal one. It will, however, be a big leap forward in placing the average or better-than-average community in a position where it can contend for a share of new payrolls.

It will diminish the number of situations now encountered where local people say, "Bring us the industry and we will supply the land." It will avert situations that so frequently develop where, when it becomes rumored that an industrial plant site is to be constructed, the price of a site under consideration is inflated beyond all reason.

Plant location experience demonstrates that while most manufacturers are willing to overlook a slight increase in land values for industrial occupancy, they are easily irritated by any hint of gouging. The actions of independent land owners are unpredictable, and many communities have lost prospective plants under adverse pricing conditions or circumstances which lead to "sticky" bargaining.

As indicated, firm control of industrial real estate by local action groups must be exercised either through ownership or long-term option agreements. The latter are all too often loosely drawn. They frequently do not contain clear-cut provisions for right of entry; for right of the purchaser to make boundary and topographic surveys, core borings, test wells, and other engineering tests; requirements for appropriate zoning; provisions for easements, development of utilities, rail lines, access roads, etc.

As a general rule, it is recommended that all properties reserved for conveyance to the industrial prospect should have access to rail service. Even if the company is not primarily a rail user, the continued value and marketability of the property is enhanced by the ready access to rail facilities.

In a limited number of cases in Appalachia it may be desirable to consider development of industrial parks or industrial land use districts. These are most useful in an area where good industrial sites are scarce, difficult to assemble or acquire, difficult to preserve against the encroachment of residential and commercial uses, and where the demand for industrial land is strong. Ordinarily, this combination of factors will be found only in large urban areas experiencing vigorous manufacturing and distribution industry growth.

(b) It is recommended that the States cooperate in pooling their information for large riverside sites by creating a Regional Site Bank. This recommendation applies particularly to sites of several hundred acres or more needed by pulp and paper mills and textile mills.

In Report No. 1 of the Appalachian Location Research Studies Program, it is demonstrated that (1) the pulp and paper industry has strong growth potential in the Nation and in Appalachia, and (2) that choice riverfront sites which pulp and paper makers prefer are a dwindling commodity in the eastern half of the Nation. It is further demonstrated that assembling such sites involves crucial questions of woodland ownership, effluent disposal, and service by two or three rail lines.

Because these questions cut across watersheds, river basins, and even state lines in many instances, it appears necessary to set aside purely local considerations and tackle the problems on a regional basis, bringing in not only state industrial development agencies but also rail carriers, utilities, and regional bodies, such as the TVA. Except for the woodland questions, many of the same considerations enter into large site identification and development for textile mills, the chlor-alkali industry, and synthetic fiber plants.

Further questions of public policy are involved. For example, the public has a greater ability to absorb risks, can command more resources, and can wait longer for results than an individual or a few individuals can. When an economically feasible project cannot be handled by an individual or a group of individuals because they cannot assemble the resources, cannot stand the risk, or want an early return, the public must act if the best use of Appalachian natural resources is to be achieved.

This then establishes a basis for considering the Site Bank not merely as a vehicle for pooling information but possibly one which might acquire, own and reserve riverfront land of prime potentials for future industrial use. The creation of an appropriate body undoubtedly would require Federal and State funding to support surveys, land purchase and operating expenses.

(c) It is recommended that planning and management of private forest lands be advanced through expansion of services now provided by public foresters and extension foresters now functioning under programs financed cooperatively by the Federal Government and the states.

Most of these assistance programs reach relatively few owners in the nation--possibly 300,000 a year--because there are so few service foresters in relation to the number of owners to be served. Although the large pulp and paper companies have large forest land holdings, most firms buy stumpage and pulpwood from private holdings for which they may have little or no direct control over cutting methods.

The better planning and use of these lands will (1) facilitate the growth of the pulp and other forest-using industries, (2) foster the Site Bank and forest land ownership concepts presented in Recommendation "C", and (3) will be conducive to control of soil erosion.

INDUSTRIAL WATER DEVELOPMENT

Any Appalachian community ambitious enough to seek new industry needs to remember that (1) industries can locate only where plant sites are available and (2) water can be delivered only where service mains of adequate size and reserve delivery capacity are available. Once this duality of site selection is understood, other elements of water's role in plant location fall into their proper places.

Most manufacturing operations consume modest amounts of water. Half of those in the nation use less than 50,000 gallons a day; a quarter purchase less than 10,000 gallons a day. In contrast, establishments with daily water intakes of more than 500,000 gallons a day account for fewer than a quarter of the nation's plants.

Appalachian industrial plants (and candidates for location within the region) are not greatly different from those in the nation. They use water in five principal ways: for sanitary purposes, for fire protection, in processing operations, as a cooling agent to dispose of heat, and as a medium for carrying away waste products derived from manufacturing. Since the first three uses predominate, most plant operators prefer to purchase potable water from public supplies. Only the relatively few are large enough users to be interested in developing, pumping and treating their own raw water supplies.

If attractive plant sites are available, if the local water system has sufficient reserve water delivery capability, if properly sized and engineered service mains are nearby, if other location factors are favorable, a community can establish a contender position for many attractive payrolls--if it can supply credible factual information on the cost and time involved in extending mains to the prospect site.

Usually when water utilities can be extended to the site within 45 days after sale of the site and the prospect has confidence in the promises of the municipality and developers to perform, a community will not run too much risk of being eliminated in the early screening process by not having all utilities at the lines of the property reserved for industry.

Gauging the water delivery capability and reserve capacity of Appalachian community water systems is frequently a frustrating experience for the site-seeking businessman. All too often communities rely on claims such as "abundant water resources," "large reservoir capacity" and the like. Seldom does the local development group proffer the basic information that is needed: (1) population served, (2) normal rated capacity of the supply system under average conditions, (3) maximum capacity, (4) average output, and (5) maximum-day output.

Given these factors, it is possible to determine whether a water utility can be considered adequate. According to the FWPCA 1/ a system with at least a 20-percent total excess in rated capacity above its maximum-day demand should be able not only to maintain a continuity of service for normal growth of population and industry but also to meet any major conflagration or defense emergency.

Plant location assessments of community capability for satisfying the needs of a single new industry demand a more conservative approach, however. Usually, as in electric utility ratings, it is desirable to introduce a safety factor of three. Thus, a new plant expecting to use an average of 50,000 gallons a day would want to be assured of 150,000 gallons reserve capacity, assuming that water main sizes and the distances they would be extended are in proper balance.

It is fairly obvious from the available statistics that municipal facilities for satisfying new industry water needs are now concentrated in relatively few communities rather than generally dispersed throughout Appalachia. It is less obvious but important to recognize that efficient use of federal and local monies for construction of water systems needed to support industry demands careful identification of those communities having viable economies and other attributes for industry. To accomplish this, it is strongly recommended that:

(a) All decisions at the local level having to do with grant applications for waterworks expansions be made only after full coordination with the state agency handling community planning and industrial development. The important principle to follow here is that there must be clear differentiation of waterworks expansion programs needed for public health purposes and those which may or may not be desirable for industrial development purposes.

1/ Federal Water Pollution Control Administration

(b) Funds should be made available to expand and intensify data collecting programs now operated by FWPCA in cooperation with state health departments and local waterworks officials. FWPCA now publishes, at five-year intervals, an Inventory of Municipal Water Facilities. The latest issue, published in 1963, provides 12 columns of information for each community water system or water district in the states. Where data are complete, it is possible to determine from the figures whether water supplies are adequate.

Unfortunately, there are many gaps in the figures for such key items as Safe Yield Impounded, Maximum Dependable Draft for Ground Water, Rated Plant Capacity, Average Plant Output and Improvements Needed. Further, the five-year span separating these inventories limits their value as industrial development planning tools. Finally, few local industrial development groups are skilled in interpreting the data for industrial prospects.

Accordingly, it is highly important that more frequent inventories be made. It is equally important that state and local groups extend greater cooperation. Finally, there is needed an education program which will make community action groups aware of the values of this information to industrial prospects.

(c) States should enact legislation recommended by HEW in its codified "Urban Water Supply and Sewerage Systems Act". Implicit in the value of this package proposal by HEW is that the most effective use of water for area development would result if patterns of potential industrial sites and subdivisions could be superimposed upon the patterns of potentially available industrial water, and if industrial areas could be developed so as to balance availability with demand if the need might arise.

SEWAGE TREATMENT AND EFFLUENT DISPOSAL

The Clean Waters Restoration Act of 1966 has nationwide significance. Whether the new legislation will fulfill its sponsors' expectations in Appalachia, and whether it will enhance community prospects for new industry soon enough, however, turns on a number of uncertainties. Chief among these are (1) the availability of construction grants, (2) the cost of money to state and local governments, (3) the money and men needed for effective functioning of state water control commissions, and (4) tax relief for companies installing new industrial waste treatment facilities.

The mere existence of a municipal sewage treatment plant can be misleading. Sometimes such plants do not work properly or are run by incompetent personnel. Monitoring a stream is no easy task. In policing the situation, water control commissions are handicapped by a thin staff, small budgets and the ever-present legalistic byplays which surround enforcement.

If Appalachian communities are to derive maximum benefits from the new legislation, fairly high priorities are needed for the following recommended actions:

(a) Larger legislative appropriations for water control commissions in the states. Such appropriations must be ample to support a larger trained staff for monitoring streams, to expand the number of stream monitoring stations, and to educate personnel in the operation of municipal sewage disposal plants.

(b) Tax relief for industry on facilities designed to control water pollution. The principle should be that industry should not be taxed as heavily on structures and equipment installed to improve air and water quality as it is taxed on profit-making properties. Virginia and a dozen or more states in the nation offer such tax relief. This relief is particularly important for capital intensive industries which generate large volumes of difficult-to-treat wastes.

Application of these tax relief provisions should be broad enough to encourage the use of industrial bio-filtration package units in communities where the public cost of expanding municipal disposal plants or extending sewer lines to serve fringe area plant sites is unreasonably high. Bio-filtration units are available, completely factory assembled, to serve plants with population waste equivalents of from 50 to 500 people.

It is further recommended that the states enact legislation for the use of such package plants that will be consistent with HEW proposals codified as the "Individual Sewage Disposal Systems Act."

(c) River basin management programs should be expanded to include periodic surveys on the waste assimilative capacity of stretches of streams at or near sites reserved for pulp and paper mills. As stressed in the Appalachian Industry Location study for this industry, the degree of information considered most useful is the 5-day Biochemical Oxygen Demand (BOD) assimilative capacity over the range of water temperatures and streamflow rates that will be encountered in any year.

In some instances, these values can be computed from existing data or are substantially available in documented publications, such as those issued by the State Water Control Board of Virginia. In other cases, only the sketchiest of information is available and additional studies by the appropriate federal and state agencies will be required.

FEDERAL, STATE, AND LOCAL INCENTIVES TO INDUSTRY

Incentives designed to foster industrial growth will be of varying significance to individual industries. Indeed, even within a given industry, the impact of a particular incentive will vary with differing management philosophies.

The 12 Appalachian States run the scale as to variety of incentives offered. Federal programs, available to all, provide the only common denominator. Socioeconomic and political factors prescribe the variations in state offerings which, in turn, frequently establish the tenor of community efforts.

Financial Incentives

There exists today a broad range of financial inducements used to solicit new industrial development. Many of these have proven their effectiveness, as representatives of "Fortune's 500" move to enjoy benefits previously thought of as the domain of smaller, less financially able concerns.

Executives involved in selecting new locations will seek to minimize both financial and operating risks. Potential losses are usually substantial. In many cases, failure at the new location can mean the demise of an organization. Thus, prudent location searchers frequently will look for such cushions as financial assistance, tax relief, aid in manpower training, extension of utility or community services to chosen sites, etc.

Experience has demonstrated that financial inducements of one nature or another can play a key role in giving a competitive edge to one of the community finalists which otherwise satisfies the industry's primary locational requirements. Thus, these types of incentives must be looked upon as a significant tool in industrial development efforts. As a word of caution, however, these incentives must be properly applied so communities may avoid dissipation of the area's tax base. Some of the tools which should be considered by industrial development agencies, are discussed in the following paragraphs.

(a) Industrial Financing - Financial assistance programs evidenced in the 12 states range from the privately financed quasi-public Virginia Development Corp. (making industrial loans) or the business development groups (and financial advisor on the development board) serving the same purpose in South Carolina, up to Maryland's comprehensive offering which includes

county and municipality revenue bond issues, a state mortgage insurance program, development credit corporation, and state participation in EDA industrial loans.

An increasing, open solicitation of revenue bond financing by leading U.S. industrial giants, demonstrates the attraction of this low-cost method of establishing new facilities. Examples abound where small communities have successfully financed large-scale projects for top-name concerns. Communities, where revenue bond financing is available, are frequently in direct competition with those where enabling legislation is not in effect. The latter can remain competitive by taking full advantage of the Treasury Department ruling 63-20. Local non-profit development corporations can thus supply 100 percent financing of plant and equipment through the issuance of tax-exempt securities. Care must be taken to ensure compliance with each of the ruling's stipulations. Financing is based on the financial strength of the corporate tenant, and the bond amount and coupon rate are determined accordingly. Interest rates generally run 4 to 5 percent with terms of 20 to 25 years. Bonds are normally sold in private placement, and the manufacturer's name is not publicly advertised.

One key stipulation of the Treasury ruling requires the property to be deeded to the city or county upon retirement of the bonds. Lease renewal options can be written into the original agreement and generally run for 40 one-year renewals at nominal rentals (designed primarily to cover ad valorem taxes lost when the facility becomes the property of the city or county).

Purchase options must not be included in the initial lease. However, the Federal Government is not concerned with the disposition of the property, once it reverts to city or county ownership. Possibilities of a side agreement exist--if such agreement is entered by the manufacturer and local government unit after the bonds are sold, and involves a "valid consideration."

(b) Tax Exemptions - Suspension of the 7 percent investment tax credit has required a review of cash flow calculations for project justification on the part of most leading firms.

Adoption of programs such as Maryland's (equipment exempt from state taxation; equipment and inventories partially or totally exempt from county taxation) will be most effective in offsetting dampening effects created by suspended Federal credits. While the appeal of this type of incentive will not be universal, its inherent selectiveness emphasizes an attraction for capital intensive operations--operations which would be most beneficial to the industrial mix of the region. Tax incentives

will seldom be of sufficient import to override other, primary locational advantages. Frequently, however, they will dictate the final selection between two or three equally attractive communities. Moreover, adoption of this recommendation could provide the means to justify moving ahead with investment plans rendered marginal by the Federal action.

Presently, five Appalachian States do not offer any tax relief. The balance offers programs which range from accelerated depreciation to outright exemption from property taxes over a specified period. Two states rely on arm-to-arm negotiations for tax shelter at the local level. Maryland stands alone in this highly effective approach, and enabling legislation would, thus, be required in all remaining states.

(c) Shell Building Program - Under some circumstances, workable inducements or incentives, which go beyond presently available incentives, are probably necessary to encourage outside industry to "test" areas with a minimum of risk.

We believe this can be accomplished through shell building programs (on a short-term lease), or the renovation of some existing structure and conversion into manufacturing space. Admittedly, such action carries a risk factor. In fact, what it does is transfer the risk from the prospect to local interests, who would have a selfish interest in seeing the project succeed. In fact, they could not afford to have it fail.

(d) Extension of Utilities and Services - As noted earlier, community responsiveness will be critically evaluated by the location-seeking executive. Sites where utility or other services are lacking will not be competitive unless firm commitments are readily available. Local action groups must be attuned to the needs of industry and aware of their area's shortcomings. To capitalize on a locational opportunity, decisive action will be required. Rarely, does any community uniquely fulfill all the locational needs of a specific industry.

Typical areas where such assistance is frequently required include: (1) the extension of rail service, (2) installation of gas lines, (3) providing fire and police protection outside established districts, and (4) installing water and sewerage lines. The costs of providing rail and gas services might well involve community financing with a rebate agreement from the railroad or gas company based on actual utilization or consumption.

(e) Specialized Incentives - When an area can demonstrate a potential for a special industry, there are occasions where a tailored approach may speed industrial development. Such is particularly true for the pulp and paper industry within Appalachia. The following are two specific considerations worthy of attention:

- (1) existing taxation of woodlands be replaced or modified with yield or severance taxes; and,
- (2) the establishment of preferential tax credits for the increased utilization of hardwoods.

Specialized Road Programs

Recommendations which should govern basic transportation policies and activities for Appalachia are presented elsewhere in this report. Those recommendations are of first importance.

On a somewhat lower rung of importance are needs for secondary actions which best can be described as "Specialized Road Programs." From one point of view they may be regarded as a bits-and-pieces type of planning or lack of it. From still another vantage point these planning deficiencies can be seen as impediments, some serious, others of irritant value at most, in the path of site-seeking businessman. Few such conditions can be said to be so generally prevalent as to carry broad regional significance.

For example, Appalachian Kentucky has more than its share of "swinging bridges"--usually narrow, light-duty suspension structures for pedestrian or light vehicle crossings of creeks--which isolate people and some potential site areas from mainroad access.

In some states, among them Pennsylvania, there appears to be a policy that state routes will be improved or extended to remote industrial plant sites only if a definite need for this expenditure is shown. Placing the entire burden of the proof upon the prospect, this policy puts unnecessary roadblocks in his way. Various Appalachian states will commit themselves in advance to make reasonable expenditures conditional only upon location of the plant.

Elsewhere, the lack of all-weather, farm-to-market roads has two consequences: (1) failure to develop reliable supplies of farm raw materials for industry processing, and (2) poor access of farm workers to the factory labor market.

Somewhat the same consequences appear when logging access roads needed to connect stumpage with highways and mechanized yards for pulpwood loading are missing. Often these work roads do not get built because costs plus maintenance charges may range as high as \$200 to \$1,000 a mile or more. The lack of such roads acts to restrict the potential availability and continued flow of pulpwood, as well as hinder good land management.

One of the more common experiences in Appalachia is to find roads which are difficult to travel in bad weather because of heavy rain wash from the hillsides. Often the corrective measures

required involve nothing more complicated than installation of culverts and other forms of storm drainage on stretches of road known to be troublesome.

If there is any common denominator to this assortment of problems it is possibly a need to make clear to the industrial prospect that local road programs do not have to wait on the completion of long-term Federal construction projects. Most live and breathing industrial prospects attach less importance to what will be done in the distant future than they do to actions which expedite the start-up and smooth operation of a new plant.

In theory it should be possible to assign some orders of priority to the more than 1,000 miles of local access roads authorized under Section 201 of the Appalachian Act. Theory and the exigencies of plant location frequently must part company, however. Accordingly, it is recommended that:

(a) Decisions at the state level having to do with the construction of local access roads should be made only after full coordination and review of plans by the following groups: the state agency handling industrial development, the local community action group, and utilities and transportation carriers serving the affected area. There should be sufficient flexibility of response to take care of needs as they develop. Possibly this would be aided by a set-aside of funds for contingency use. It is further recommended that informative maps and information sheets containing completion dates for local access roads and improvements be issued periodically for dissemination to local groups and industrial prospects.

Access to Technological Resources

For the Appalachian economy to achieve fuller utilization of its large human and physical resources means, over the long run, greater introduction of technology into the region. Ways must be found to have the region gain better access to such technology through the creation and development of appropriate institutions which function as parts of a viable regional economy.

Among the 25 industries presented as Appalachian Industry Location Studies there are at least two--pulp and paper and refractory metals--for which appropriate public institutions of technology may have crucial significance. The first of these industries is rather well-disposed throughout the region. The second is concentrated in a relatively few islands of activity, which might well become an archipelago of broad regional importance, given the stimuli of appropriate public policies and actions.

To the extent that public funds can be made available, it is strongly recommended that the following steps be taken:

(a) Creation and staffing of two regional centers for research on the pulping of hardwoods and the utilization of hardwood pulp fibers. In general, the practical limits of substantial and economic increases in softwood utilization have been reached, according to many observers. The major gains to be made, in the opinion of many, is development of hardwood pulping technology to the present level of softwood pulping technology. When this happens, it is believed that a much wider range of pulps will be within reach of the papermaking industry.

Present paper and board production in Appalachia is about 7 to 8 percent of the nation's total. Hardwood reserves, however, may be large enough to sustain an industry of twice that size. Since the present industry disburses annual wages and salaries of about \$200 million, it is readily apparent that success in this technological effort could have a major impact on the region's economy.

(b) Creation and staffing of a new Bureau of Mines regional center for research on extractive metallurgy of refractory metals and development of alloying and fabricating methods. Industrial, space effort and defense requirements for the refractory metals appear poised for growth that will demand a larger share of public support of technology in centers proximate to areas which can satisfy the locational requirements of this group of industries.

Appalachia has the necessary energy and water resources, coupled with access to consuming centers for the products of the industry. Needed is the forced draft of regionally-centered public research.

(c) More effective application of the State Technical Services Act of 1965. Consideration might be given to concentrating efforts largely on achieving greater efficiency in production. Dissemination of this type of information and technology is conducive to cost reduction and is, therefore, a direct stimulus to economic growth.

State and Local Tax Burdens

In Appalachia, as elsewhere, the expectable state and local tax burden for any manufacturer locating a new plant depends on (a) the nature of the project and the business, (b) the precise site where the project will be constructed, (c) who the manufacturer is, and (d) intercommunity competitive considerations then prevailing. It is an academic exercise to present interstate comparisons of taxes as an element in the cost of doing business when intrastate variations tend to be of greater magnitude, particularly in the Appalachian States.

To cite one example, state and local taxes for a new synthetic fiber plant with sales of \$27 million can vary by as much as \$58,000 a year in one Appalachian state, depending upon the particular locale where the plant is built. This is not a singular case, for variations of from \$30,000 to \$50,000 are not uncommon in states surrounding the example cited.

Because of these circumstances, no specific recommendations are presented in this section. Attention is directed, however, to item (b) under "Financial Incentives" earlier in this section.

COMMUNITY ENVIRONMENT

Industrial Orientation

Obviously, the choice of community size and environment is a problem to be solved individually by each company. What is the most suitable environment for one firm, may not be so for another. Like all imponderables, there are too many different angles to be covered in catch-all generalizations.

Among the factors which the location consultant must appraise, mostly in qualitative terms, are (1) local traditions and attitudes regarding work and its place in life, (2) feelings about women working, (3) reactions of friends and neighbors to "outsiders", (4) receptivity to shift work, (5) community expectations for the new plant, and (6) who speaks for the community. Often these down-to-earth considerations override community size and determine not only the potentials for successful staffing of a plant from the local labor force but also how well the community may adapt to transferees and their families.

A sizable number of Appalachian communities are industrially sophisticated enough to have a proper appreciation of these nuances. A much larger number are not, however, and there is the very real problem of developing this awareness. Because they have been said over and over again, all the usual platitudes, stereotypes and folklore of industrial development seem to go in one ear and out the other. Something else with impact is needed and this is probably first-hand exposure to what goes on in other communities and their industries.

There exists a tremendous opportunity for interchange of information. There are also channels in the process of formation which could be used to promote this interchange. All that is necessary is to bring the two together.

Under Section 302 of the Appalachian Act appropriations provide for grants to be used for the formation of local development districts and research. Each state also has on file with the U.S. Travel Service a listing of plants which offer tours of their operations. These tours, part of the program to welcome international visitors to the United States, are classified by industry and by state in Plant Tours, published by the U.S. Department of State. (There are several hundred such tours available in Appalachia)

If it makes good sense for the industry and the foreigner to meet face to face on the factory floor, it makes even more sense for community action groups from one area to acquire this same

experience away from their home communities. Accordingly, it is recommended that:

(a) Development district activity should be expanded to include "exchange" visits and tours of industrial plants in various parts of Appalachia and outside Appalachia. It is further recommended that this become a systematic and continuing program of education, giving communities in one development district access to experiences in another.

The immediate benefits of this program would be first-hand exposure to a variety of industrial operations, providing insights not likely to be acquired by any other means. The longer-term benefits would be a dwindling of parochial attitudes through cross-fertilization of successful community action programs.

Undoubtedly, this activity would require larger funds than are now available. It is strongly recommended that such funds be appropriated by Congress.

Public Health Measures

Poor health is a root cause of absenteeism in industry--and excessive absenteeism has attached to it a high price tag for the employer

The effect of absenteeism can be illustrated by citing a specific example. A plant of 125 employees operates 4 final assembly lines where 56 workers put together the completed product. The absence of one worker at any of the 14 stations will result in a 19 percent drop in productivity. Efficiency is impaired all along the line. This loss in production will require 72 hours of make-up overtime production. At \$1.85 straight time earnings, one man-day of absenteeism on the final assembly line will cost the company \$200 in overtime. In addition, the unit cost for those items produced will jump radically and result in lost time valued at \$118. The total loss will come to \$318, not including overhead and fringe benefit charges. Although the absent worker may view the cost of his absence at \$14.80, the expense to the firm is much greater.

The presence of chronic, poor health and environmental conditions, or any suspicion that they may exist, is a source of disquietude on other counts which the site-seeking businessman may be reluctant to bring out in the open. This is certainly true where a new plant move involves a sizable number of transferees and their families.

Virus-borne health disorders, such as hepatitis, which often escape diagnosis, will be suspected when potable water supplies in small communities come under scrutiny. There is more than enough material printed about Appalachia to feed such fears. One of the most vivid accounts yet to appear is the documentary on the Kentucky River written by staff writer John Fetterman and photographed by Bill Strode in the Sunday, August 8, 1965 edition of The Courier Journal Magazine (Louisville).

Other aspects of environmental health that do come under sharp scrutiny are facilities for hospital, medical, and dental care. There are no reasons for believing that the major urban areas offer facilities inferior to those found elsewhere. There are, however, reasons for believing that Appalachia as a region may be the subject of unfavorable comparisons.

A measure of care available within regions is the accreditation of hospitals by Joint Commission on Accreditation of Hospitals for the United States. Approximately 59 percent of the United States hospitals are thus accredited. In states with considerable territory within Appalachian Region, the respective rates are

Alabama 45 percent, Tennessee 52 percent, Kentucky 53 percent, West Virginia 60 percent, and Pennsylvania 75 percent. For comparison purposes, accreditation data for other selected states reveals the following ratios: New York 82 percent, Massachusetts 81 percent, New Jersey 74 percent, and California 62 percent. It should be noted that the mere existence of a hospital in an area provides no magnet for industrial development. However, a hospital's level of services offered and the standards it meets can often preserve for an area its opportunity to attract manufacturers.

Another gauge of health services focuses attention on the number of physicians and dentists per 100,000 people. In the United States, 149 medical doctors on the average serve each 100,000 persons. The corresponding numbers for principal Appalachian states are Alabama 79, Tennessee 113, Kentucky 95, West Virginia 103, and Pennsylvania 153. In the leading industrial states, the comparable figures are New York 207, Massachusetts 196, New Jersey 143, and California 178.

Similar records for dentists reveal the following data: Alabama 31, Tennessee 42, Kentucky 37, West Virginia 40, and Pennsylvania 60. The industrial states being used for comparison exhibit generally higher numbers: New York 79, Massachusetts 69, New Jersey 62, and California 59.

Generally it can be expected the Appalachia counties will compare less favorably with the parent states. Further, it can be anticipated that transferees tend to be more critical of conditions in communities where they are expected to start up housekeeping anew than in their home communities.

Appropriations available to Appalachia under Section 202 of the Act provide substantial sums for construction and operation of regional health centers. There is also a Health Advisory Committee. Industrialists will welcome both moves once they get to know more about them and their objectives. In our opinion, industrialists will also support the following recommended actions:

(a) The Health Advisory Committee should accelerate efforts to help the many hospitals without Joint Accreditation to achieve this mark of quality care. In many cases, this will require extensive grants to pay for equipment or facilities. In other cases, professional staffing requirements will have to be met. To determine where money and efforts should be expended will require a study in depth by those with the proper credentials.

(b) The Health Advisory Committee must develop a master plan which would outline the strategy for a massive assault on environmental health problems and provide for the program's implementation and continuous evaluation. Such a master plan would incorporate the recommendations made in the pollution control section of this report.

In its conception, the plan would specify the purposes or goals to be achieved, such as the elimination of the most prevalent infectious and contagious diseases. A clear statement of the goals is necessary to the success of the program. When combined with continuous evaluation, the tendency to drift away from the purpose or to take satisfaction from an increase of services or personnel--which may actually detract from the ability to achieve the stated goals--can be avoided.

By closely defining the goals, a gauge is furnished to measure the program's progress. It also presupposes a factual determination of present conditions from which to base improvement. A series of objectives, each capable of practical achievement, would be the building blocks of the master plan's structure.

Liaison - The Role of Communications

While many branch plants operate as self-sustained units in Appalachia, liaison with a headquarters office (typically New York or Chicago) is an important locational factor, particularly during the startup period. Excellent communication will be a continuing necessity.

Experience in the apparel industry, for one, brings home the urgency of the needs. Typically, many apparel plants operate without policy manuals. Company policy and changes in policy are communicated orally, in conferences, or occasionally by exchange of memoranda. Usually the local plant manager is the only executive intimately acquainted with production problems in his plant, and he is directly involved in policy formulation. Conferences are not scheduled for specific days. Instead, they are arranged on rather short notice. Their purpose, in addition to policy setting, involves production and sales coordination and exchange of information.

In addition to the conference type of communication, many apparel plants utilize frequent standardized reports, including a daily production report, a sales report from the main office to the branch, semimonthly financial statements, bimonthly inventory reports, and semimonthly labor cost reviews. In all cases, the status of orders, production, finished inventory and shipping dates must be carefully coordinated.

From a locational standpoint, the cost and effectiveness of liaison will be measured by the distance between the New York (or Chicago) office and the branch plant, mail deliveries and transit time for executives traveling to or from the plant. These problems can be minimized by selection of a community within reasonable distance (one-hour driving time) of an airport having frequent flights to and from New York or Chicago. Investigation must also be extended to include the quality of telephone service, the availability of teletype facilities, and frequency of mail dispatching.

Many small and medium-size Appalachian communities with established industries appear to be unaware of the importance the businessman attaches to liaison because local people themselves frequently are guilty of poor liaison with area employers. Something which approaches a massive task of education is needed. Accordingly, it is recommended that:

(a) Development districts establish "communications clinics" to educate communities in practical steps that can be taken to facilitate liaison of branch plants with home offices. Participants in these clinics should include area postmasters, communications carrier representatives, and airline customer service agents.

Specific goals should include adjustment of rural mail delivery schedules to provide early-morning delivery of mail to manufacturing plants; introduction of telephone trunklines to permit direct long-distance dialing of calls and leased wire time sharing, and expedited delivery of business mail to and from airports. Further upgrading of facilities at airfields for executive craft can make a secondary contribution.

APPENDIX A

Appendix A

Industry Definitions, Selection Methodology, and Analytical Techniques

Industry Definitions

The experienced location analyst has little difficulty in conveying what he has in mind when he speaks of the "motor vehicle parts industry." He tends to think in terms of the basic decision-making units of the industry, i.e., companies with an important stake in producing parts for motor vehicles. He defines the industry in terms of common denominators which are the essence of its competitive structure--the size and location of its markets, product lines related as to production and marketing, who shares in the business, pricing structures and cost relationships, decentralization of manufacture, and so on.

All of these factors have paramount significance in selecting locations for the industry. This significance overrides conventional definitions of the industry as given in the Standard Industrial Classification Manual used by the Bureau of the Budget. For example, the Manual classifies "Motor Vehicle Parts and Accessories" under Code 3714. But major elements of the industry are scattered under other codes, including SIC 30, 32, 33, 34, 35, 36 and 38. Any realistic appraisal of locational trends in the industry must take this situation into account.

The 25 Appalachian Industry Location Studies, briefly characterized in the appended Table 1, are constructed from this point of view. The analysis of "Motor Vehicle Parts," one of the industries, does in fact cut across conventional SIC codes. It considers the industry from the function of the location analyst. The same premise is the basis for selecting and grouping other specific SIC codes for unified industry analysis treatment.

Selection Methodology

In deciding what four-digit industries to include and which ones to leave out, a systematic selection process was used to screen all 424 four-digit industries found in the Standard Industrial Classification Manual. To be considered as a candidate for further study, each four-digit industry first had to satisfy certain qualifying requirements for "growth." While there are many concepts of growth, the concept of the decision-making units of the industry (i.e., companies) was the rationale used in this program.

Conceptually, the screening process placed emphasis on applying to the industry these well-accepted criteria for a growth company:

- (1) Quality of management. Superior management can be measured by three standards:
 - (a) Good return on equity
 - (b) High operating profit margin
 - (c) High net profit margin
- (2) Research and development. Growing firms are receptive to new ideas and new projects. Therefore, emphasis on applied research is an indication of growth.
- (3) Diversification. In itself, diversification is not enough; broadening of product lines must extend into growth areas.
- (4) Monopoly or semi-monopoly. Control of, or a strong basic position in, a profitable product or group of commodities has been essential to the growth of chemicals and electronics.
- (5) Mobility and plant location activity. If the industry has continued to operate in the same locations over a long period of time, it cannot be considered a true growth industry.

Each of these aspects of growth can be considered as expressions of underlying locational factors. Further, many of these factors lend themselves to one or more types of measurement: direct quantitative measurement, trend analysis, proxy measurement and first approximations.

Of all these, mobility is the most difficult to measure directly from published statistics. In practical terms mobility must be gauged by plant location activity and investment--which includes expansions, new facilities and the entry of additional producers. Generally, plant location activity is highest in those industries which are growing faster than the national economy.

One measure of locational activity, generally the least satisfactory, is through a Census of Manufactures count in two comparison years (e.g., 1958 and 1963). Appended Table 2 gives this comparison for the 25 industry groups finally established for further location analysis. The basic defects in this type of analysis are three: (1) conceptual limitations in industry definitions of the Standard Industrial Classification Manual, (2) lack of quantification by capacity and employment data, and (3) lack of data

for more recent years. Further, even with adjustment for these limitations, the trends and dynamics of plant location activity are missing from this snapshot.

Additional published services of locational activity include the 1963 and 1966 editions of the Fortune Plant and Product Directory, semiweekly editions of Moody's Industrials (generally limited to firms in which there is public ownership) and announcements of the various state development agencies. No two states keep their books exactly alike, however. Many report under the heading "new manufacturing plants" announcements which are not new plants but expansions and establishments not engaged in manufacturing or incorrectly classified by branch of manufacturing. (See, for example, Summary and Recommendations for State Agencies Defining and Reporting New, Expanded and Relocated Manufacturing Firms, prepared by Industrial Development Division, Ohio Department of Industrial and Economic Development, 1961.)

Thus to arrive at reliable assessments of trends of locational activity, many independent and private sources of information had to be utilized. These included items from the Dun & Bradstreet Data Bank (see appended Table 2), trade association surveys and releases (e.g., American Paper Institute), as well as a large body of proprietary information in the Contractor's plant location files.

These searches reduced the number of four-digit industry candidates first from 424 to 127 and, finally, to the 90 which are embraced by the 25 Appalachian Industry Location Studies.

Analytical Techniques

In the early stages of the screening process, preliminary approximate measures of basic locational factors were introduced into matrix analysis. Such factors initially included average hourly earnings, required labor skills, transportation cost significance, water use orientation, labor intensivity, power orientation and fuel orientation.

At intermediate stages, this information was refined by quantifying most of these factors and introducing additional ones. As an example of the latter, growth was measured historically over the 1960-65, and as growth forecasts, for the 1965-75 span of years. The latter, in all instances, were derived from composites of industry opinion on the outlook for sales or consumption.

When intermediate analysis was completed, the determination of associative groupings of four-digit industries for final locational analysis became a straightforward undertaking setting the stage for:

(1) Making detailed evaluations of industry structures and locational characteristics. These evaluations were shaped by background information in the Contractor's proprietary files, most of it acquired in the course of making several thousand locational searches for industrial corporations.

(2) Verifying the locational experiences of appropriate industries inside and outside Appalachia. This task was carried out by making personal calls on both establishments and headquarters offices.

(3) Developing additional background information on successful programs used to make areas more attractive to industry. For the most part, this information was developed through personal contacts with state and community planning groups, and the area or business development departments of transportation industries, and electric and gas utilities.

Each of the 25 Appalachian Industry Location Studies is presented in a uniform format with content classified under the following headings:

Section I	Profile of the Industry
Section II	The Industry's Prospects for Growth
Section III	Technology and Trends
Section IV	Primary Factors Influencing Selection of Locations
Section V	Selecting Public Investment Policies and Activities Which Will Enhance the Competitive Position of Appalachia

In Section V an effort is made to deal with policies and activities which appear relevant only to the industry under analysis. As the preparation of these studies proceeded, certain common denominators having relevancy for a majority of the industries began to reappear. Further, the interlocking relationships of many such factors made it clear that regional considerations would in many cases transcend industry considerations.

Accordingly, the Section V recommendations in each locational study must be regarded as extensive rather than intensive. Recommendations presented in this Summary Report comprise the definitive policies and actions which should be considered as a total program to make Appalachia more attractive for the 25 industries.

As necessary background, Sections I, II and III of each location study present information on the structure of the overall industry, its economic impact, prospects for growth, and developments in technology that are germane to locational activity. The emphasis is on trends now shaping the industry's growth rather than on historical developments which no longer may be significant in the outlook. Accordingly, the evaluations are accompanied by only the most necessary technical qualifications and explanations.

Throughout the project, many choices had to be made. Often these involved the use or non-use of privileged information that was (or appeared to be) in conflict with some standard published sources, such as the Census of Manufactures. Wherever possible, these conflicts were resolved by compositing data, by using proxy measures which do not disclose the operations of any one company, or by making reference to other governmental or nongovernmental data more appropriate to the purpose.

These extended evaluations convey a number of important insights which are meaningful in locational strategy. Special attention is directed to the following:

Degree of Industry Vertical Integration

A company has a high degree of vertical integration when it is largely self-sufficient in all or most of its basic raw materials. The degree to which a company is vertically integrated may have more influence than any other single factor in shaping its investment activity. Thus, one set of locational choices may be open to the corrugated shipping container manufacturer who must purchase his materials on the open market. An entirely different combination is available to the manufacturer who is "basic" because he controls, through company-owned units or affiliates, a network of production facilities for corrugating medium, liner-board, wood pulp, pulpwood, lumber and tree farms.

The degree to which companies in an industry are integrated can be gauged from data provided for plant ownership, size structure, and sales. Additionally, profit ratios provide clues to the abilities of companies in an industry to expand. Wherever possible, each industry analysis provides three measures of profit ratios: on sales, on tangible net worth, and on net working capital.

Net profit on net sales is obtained by dividing the net earnings of the business, after taxes, by net sales. This important yardstick in measuring profitability should be related to the ratio which follows.

Net profits on tangible net worth. Tangible net worth is the equity of stockholders in the business, as obtained by subtracting total liabilities from total assets, and then deducting intangibles. The ratio is obtained by dividing Net Profits after taxes by Tangible Net Worth. The tendency is to look increasingly to this ratio as a final criterion of profitability. Generally, a relationship of at least 10 percent is regarded as a desirable objective for providing dividends plus funds for future growth, including investment in new plants.

Net profits on net working capital. Net Working Capital represents the excess of Current Assets over Current Debt. This margin represents the cushion available to the business for carrying inventories and receivables, and for financing day-to-day operations. The ratio is obtained by dividing Net Profits, after taxes, by Net Working Capital.

Industry Growth Characteristics

In the national economy there are many yardsticks for measuring manufacturing industry growth: employment, value added by manufacture, capacity, shipments, consumption, income, investment activity, and so on. The regional economist is inclined to concentrate on employment and value added by manufacture, because positive changes can be regarded as measures of regional growth. The businessman, however, tends to view the prospects for his company, or the industry for which he is spokesman, in terms of shipments, consumption, income and, sometimes, capacity.

It would be highly desirable to forecast the growth of any particular industry in Appalachia. Unfortunately, the necessary information from which to construct reliable forecasts is not regionally available at a fine enough level of industry detail over a continuous span of years. In most cases the forecasts would amount to arbitrary extrapolations of changes between two or three base years, no two of which are likely to have the same position in the business cycle. Further, it would be highly unlikely if extrapolation of any single factor (e.g., employment) coincided with an overall assessment of the industry's prospects for measured growth. Finally, extrapolation of what has happened in the past runs counter to the experience of skillful area development groups and the plant location consultant, which demonstrates that regional economic development programs can be designed to influence the location, timing, or growth rate of private business.

In contrast, there is an excellent body of authoritative information predictive of growth that may be expected for specific industries in the national economy. Much of this is anchored to continuous records of sales, demand, and capacity which are constantly being evaluated and reevaluated in rolling forecasts by businessmen concerned with making investment decisions. Because of the relatively high degree of reliability involved, such forecasts are used wherever possible throughout Section II of each location study. Obviously, the area development specialist who knows how much an industry is growing and why it is growing is in a better position to understand the locational search and how it may impinge upon his local area.

Research and Development Activity

Much growth of manufacturing industry in Appalachia is generating what may be broadly described as "research and development activity". This activity embraces a broad spectrum of functions, including basic research, product and process research, sales engineering services, government liaison offices, and so on. Appalachian industries which have prominent local identification with such functions include instruments and controls, aircraft and aerospace parts, primary metals, textiles and chemical process industries, such as chlor-alkalies, synthetic fibers, foamed plastics and textile chemicals.

Although the Appalachian Location Research Studies Program does not deal explicitly with the factors governing the establishment of research and development facilities, it can be expected that substantial growth in the basic industries analyzed will be accompanied by increased emphasis on the above functions. The extent to which local areas will share in this activity remains conjectural, however. One reason for this is that, contrary to the manufacturing function, the decentralization of research continues to be governed more by individual corporate policies rather than by industry characteristics.

The establishment of a new laboratory for basic research is a comparatively rare event. In any event, proximity to corporate headquarters appears to be the major controlling influence. In contrast, the opening of regional and subregional sales engineering laboratories and customer sales-service centers with laboratory functions is dictated by the need to provide service to the customer on an almost day-to-day basis. Facilities of this type are usually placed in an urban area within convenient reach of a sizable concentration of customers.

Productivity

The subject of productivity is controversial even when measurements are made of a national economy. It is infinitely more difficult to demonstrate differentials within an industry when comparing one area (or a region) with another. So much depends on the range and quantity of inputs, including people, capital, technology, management and labor union skills, work measurement, etc.

Because of the many variables, no attempt is made in the Appalachian Location Research Studies Program to evaluate productivity in the region as against that in the nation. Instead, several national measures specific to the industries are employed. One is the change in the value of shipments per employee between two specified years. A second is the change in units of output per employee, as in the steel industry.

A third involves the use of indexes of output per man-hour published by the Bureau of Labor Statistics (BLS). As defined by BLS, output indexes are based primarily on the physical output of the products of the industry combined with fixed period weights, usually value weights for 1947-58 or value weights for 1958 for years after 1958. The index of output per man-hour is computed by dividing an output index by an index of aggregate man-hours actually worked.

For local area development groups, it is important to note from productivity measures that the role of salaried employees as opposed to hourly workers is becoming increasingly important. The educational level of salaried workers is usually higher and the costs of hiring are probably greater. This means that the general level of education in an area is coming under sharper scrutiny when the location decision is made. It also means that dismissals, or layoffs of salaried workers during downturns in business that are expected to be short-lived, will be less frequent. On the other hand, it should be pointed out that take-home pay of hourly-rated employees, in an industry where productivity is rising rapidly, may still be subject to wide fluctuations because earnings frequently depend upon output that is adjusted to business conditions.

Table 1.
Appendix A

Synopsis of Selected Characteristics for Industries
Treated Under the Appalachian Locational Studies Program

1. PAPER AND ALLIED PRODUCTS

Specified product opportunities

Wood Pulp
Paperboard
Paper
Corrugated shipping containers
Folding paperboard boxes
Sanitary food containers
Pressed and molded pulp goods

Typical investment characteristics

Pulp and Paper: Large investment in plant and equipment
Employment averages range 400-800; female representation
minor
Containers: Moderately high investment in machinery and
equipment
Employment typically 150; females 25%

Representative unit operations or processes

Manufacture of wood pulp by the sulphate, sulphite, chemical
and semichemical processes
Manufacture of paper and paperboard from wood pulp
Molding of containers from wood pulp
Fabrication of shipping containers from paperboard and
corrugating medium
Conversion of paper and board into sanitary food containers

Major end uses

Printing and publishing
Office supplies
Construction
Packaging
Sanitary paper products

Table 1.
Appendix A - cont'd

2. TEXTILE MILL PRODUCTS

Specified product opportunities

Woven and knitted cotton and synthetic fabrics
Threads and yarns
Tufted carpets

Typical investment characteristics

Moderately high investment in machinery and equipment
Employment typically 300; females vary between 23% in finishing operations to 70% in knitting or seamless hosiery

Representative unit operations or processes

Fiber preparation
Yarn spinning
Weaving, knitting or braiding or yarn into gray or unfinished fabric
Bleaching, dyeing, or printing of gray fabric to produce finished goods for cutting

Major end uses

Apparel
Home furnishings (e.g., carpeting, upholstery, draperies, white goods, etc.)
Industrial applications (filters, etc.)
Military apparel and equipment

Table 1.
Appendix A - cont'd

3. APPAREL

Specified product opportunities

Men's, women's, and children's clothing

Typical investment characteristics

Large investment in training workers

Initial employment averages 100--close to 80% females

Representative unit operations or processes

Cutting and sewing fabric

Major end uses

Final consumer demand (see specified products)

4. PRINTING & ALLIED INDUSTRIES

Specified product opportunities

Manifold business forms

Greeting cards

Blankbooks; looseleaf binders

Typical investment characteristics

Moderate investment in machinery and equipment

Employment typically 150 and 250, manifold business forms and greeting cards, respectively

Female requirements moderate to high

Representative unit operations or processes

Offset and continuous rotary press printing

Cutting, collating, and binding

Major end uses

Office supplies

School supplies

Final consumer demand (greeting cards and school supplies)

Table 1.
Appendix A - cont'd

5. ELECTRICAL COMPONENT PARTS

Specified product opportunities

Standard specification parts of the following types:

Electrical measuring instruments

Industrial controls

Switchgear

Motors and generators

Electric housewares and fans

Current carrying devices

Electronic parts

Typical investment characteristics

Large investment in training workers

Employment size 250; females 30-60%

Representative unit operations or processes

Pressing and stamping metal parts

Assembly, soldering, welding, finishing

Testing and inspection

Major end uses

Industrial apparatus - mechanical and electronic

Aircraft and aerospace

Construction

Appliances - industrial and consumer

Table 1.
Appendix A - cont'd

6. TEXTILE MACHINERY/PUMPS & VALVES INDUSTRY

Specified product opportunities

Textile machinery and parts
Compressors and pumps
Valves and fittings

Typical investment characteristics

Moderately high investment in machinery and equipment
Employment size typically 300; female representation 10-15%

Representative unit operations or processes

Metal forming and machining
Assembly, inspection, and testing

Major end uses

Textile production
Process industries
Construction, including industrial, commercial,
residential, agricultural

Table 1.
Appendix A - cont'd

7. OFFICE MACHINERY

Specified product opportunities

Computing, accounting, and electronic data processing
equipment
Cash registers
Typewriters
Copying equipment
Other miscellaneous office equipment (e.g., dictating,
addressing, etc.)

Typical investment characteristics

Large investment in training workers
Employment size 1,000; females 25%

Representative unit operations or processes

Stamping, cutting, and forming metal
Assembly - soldering, welding, cementing
Inspection and testing

Major end uses

Industrial, commercial, and institutional offices

Table 1.
Appendix A - cont'd

8. MOTOR VEHICLE PARTS

Specified product opportunities

Plastic, ceramic, asbestos, metal, and molded rubber parts
classified as follows:

Motor vehicle parts and accessories
Automotive job shop stampings
Carburetors, pistons, and machine shop products
Motor vehicle hardware
Engine electrical equipment

Typical investment characteristics

Moderately high investment in machinery and equipment
Employment size 200; females 17%

Representative unit operations or processes

Metal forming, including casting, stamping, molding, and
machining
Assembly of components
Inspection and testing

Major end uses

Motor vehicles - original equipment and replacement

Table 1.
Appendix A - cont'd

9. CHLOR-ALKALI INDUSTRY

Specified product opportunities

Chlorine
Caustic soda (sodium hydroxide)

Typical investment characteristics

Large investment in machinery and equipment
Employment size 150; female representation negligible

Representative unit operations or processes

Electrolytic separation of products from sodium chloride
(salt) solution
Product refinement into concentrates or solid form

Major end uses

Organic chemical production
Pulp and paper
Aluminum
Textiles
Plastics

Table 1.
Appendix A - cont'd

10. MATERIALS HANDLING EQUIPMENT

Specified product opportunities

Conveyors
Hoists and overhead cranes
Industrial lift trucks

Typical investment characteristics

Moderately high investment in machinery and equipment
Employment size 100; females 9%

Representative unit operations or processes

Metal forming emphasizing machining, welding, forging, casting,
and stamping
Heat treating and finishing
Assembly, inspection, and testing

Major end uses

Mining
Manufacturing
Warehousing

Table 1.
Appendix A - cont'd

11. MOBILE HOME AND SPECIAL PURPOSE VEHICLE INDUSTRIES

Specified product opportunities

Mobile homes
Travel trailers
School buses
Ambulances and hearses

Typical investment characteristics

Large investment in training workers
Employment 150; females less than 5%

Representative unit operations or processes

Wood forming and carpentry, sheet metalwork, and installation
of plumbing, heating, and electrical systems
Welding and automotive bodywork
Fitting and finishing of unitized fixtures

Major end uses

Final consumer demand (see specified products)

12. INSTRUMENTS & CONTROLS

Specified product opportunities

Process instrumentation and controls
Scientific and engineering instrumentation
Automatic temperature controls
Gas and water meters

Typical investment characteristics

Moderately high investment in machinery and equipment
Employment size 450; females 15-25%

Representative unit operations or processes

Metal forming emphasizes stamping, brazing, welding, soldering
Assembly, testing and inspection

Major end uses

Petroleum and chemical industries
Research and development
Utilities
Other process-oriented manufacturing

13. THE NONCELLULOSIC SYNTHETIC FIBER INDUSTRY

Specified product opportunities

Filament yarns and staple fiber from acrylics, nylon,
and polymers

Typical investment characteristics

Large investment in plant and equipment
Employment of 1,000; 25 percent female

Representative unit operations or processes

Extruding synthetic chemical syrup into filament form
Textile-type cutting, spinning, and/or texturizing

Major end uses

Apparel
Home furnishings

Table 1.
Appendix A - cont'd

14. METAL STAMPINGS

Specified product opportunities

Contract stamping for other manufacturers
In-plant stampings for captive use

Typical investment characteristics

Moderately high investment in machinery and equipment
Employment 150; 20 percent female

Representative unit operations or processes

Blanking of shapes
Progressive die stamping
Roll forming
Drawing
Impact extrusion

Major end uses

Transportation equipment assembly
Machinery manufacturing
Instrumentation and controls production
Packaging

15. AIRCRAFT & AEROSPACE PARTS

Specified product opportunities

Aircraft parts and auxiliary equipment
Guided missile components and subassemblies
Space probe rocket parts and components

Typical investment characteristics

Large investment in machinery and equipment
Employment 500; 14 percent female

Representative unit operations or processes

Machining and assembly of parts
Fabrication of subassemblies by fitting, fastening and welding
Inspection and testing

Major end uses

(See specified product opportunities)

Table 1.
Appendix A - cont'd

16. PRIMARY ALUMINUM INDUSTRY

Specified product opportunities

Aluminum ingot, slabs, rods

Typical investment characteristics

Large investment in machinery and equipment
Employment 1,000; less than 5 percent female

Representative unit operations or processes

Electrolytic reduction process purifying alumina to aluminum
Casting into semi-finished form

Major end uses

Nonferrous rolled, drawn, or extruded products
Castings and forgings

Table 1.
Appendix A - cont'd

17. NONFERROUS CASTINGS

Specified product opportunities

Contract casting for other manufacturers
In-plant casting for captive use

Typical investment characteristics

Moderately high investment in machinery and equipment
Employment 150; 8-12 percent female

Representative unit operations or processes

Die casting of parts from aluminum, zinc, and alloys
Permanent mold casting of aluminum, brass or alloys
Sand casting of brass, bronze or aluminum
Shell mold casting of thin-walled parts
Investment casting of precision parts
Trimming and cleaning

Major end uses

Automotive and industrial machinery
Appliances
Electrical and electronic equipment
Construction and industrial machinery

Table 1.
Appendix A - cont'd

**18. MALLEABLE AND DUCTILE IRON CASTINGS
AND STEEL FORGINGS INDUSTRY**

Specified product opportunities

Malleable, ductile and pearlitic iron castings
Carbon and alloy steel forgings

Typical investment characteristics

Moderately high investment in machinery and equipment
Employment 300; 97 percent male

Representative unit operations or processes

Casting: Melting by direct arc electric furnaces
Teeming into green sand molds
Heat treating

Forging: Preheating raw stock
Drop, upset, open-die, and press forging
Heat treating parts

Major end uses

Component parts for:
Transportation industry
Industrial machinery and equipment
Construction
Mining equipment

Table 1.
Appendix A - cont'd

19. FOAMED PLASTIC PRODUCTS

Specified product opportunities

Upholstery cushioning
Thermal and acoustical insulation
Foamed products, e.g., protective packaging, thermal food
containers
Impact absorption materials

Typical investment characteristics

Moderately high investment in machinery and equipment
Employment 100; females 30%

Representative unit operations or processes

Foaming of plastic resins by chemical reaction or heating
Forming into sheet and products via extrusion or molding
techniques

Major end uses

Home furnishings
Motor vehicles
Appliances
Construction
Packaging
Apparel

Table 1.
Appendix A - cont'd

20. ROLLING, DRAWING, AND EXTRUDING OF NONFERROUS METALS

Specified product opportunities

Nonferrous metals (principally aluminum, copper, and titanium) mill products, including plate, sheet, rod, foil, and shapes
Wire and cable
Tubing

Typical investment characteristics

Large investment in machinery and equipment
Employment 300; less than 10% females

Representative unit operations or processes

Melting and casting rolling ingots or billets
Rolling, drawing, and extruding of finished products
Coating of wire and cable

Major end uses

Construction
Power transmission
Manufacturing
Packaging
Final consumer demand (foil)

Table 1.
Appendix A - cont'd

21. MEAT AND POULTRY PROCESSING, DRIED AND FROZEN PRODUCE

Specified product opportunities

Beef, fresh and frozen
Broilers, fresh and frozen
Prepared meats (e.g., sausage, frankfurters, salami, etc.)
Dried, dehydrated, or frozen fruits and vegetables
Freeze-dried fruit

Typical investment characteristics

Large investment in training male meatpacking workers
Employment 300; females 30-55%

Representative unit operations or processes

Meat packing to portioned cuts
Meat processing, converting to sausages, frankfurters, etc.
Broiler processing and freezing
Freeze-drying of fruit and vegetables

Major end uses

Final consumer demand

22. PLASTIC AND POWDER METAL PRODUCTS

Specified product opportunities

Pressed and sintered structural metal parts
Oil-less bearings and bushings
Custom-molded plastic parts (e.g., bottle caps)
Proprietary molded plastic parts (e.g., toys)
Other formed plastic parts (e.g., signs)

Typical investment characteristics

Large investment in training workers
Employment 100; females 30%

Representative unit operations or processes

Compacting and furnacing of shapes from metal powders
Injection molding of thermoplastic resins
Compression molding of thermosetting resins
Forming of sheet plastics

Major end uses

Plastics: Packaging, construction, and surgical supplies
Powder metallurgy: automotive and appliance

23. REFRACTORY METALS

Specified product opportunities

Titanium sponge
Tungsten powder
Ferroalloys

Typical investment characteristics

Large investment in machinery and equipment
Employment 400; female representation negligible

Representative unit operations or processes

Beneficiation and reduction of ores
Electric furnace alloying of metals
Chemical processing of titanium sponge

Major end uses

Nonferrous mill products
Alloy steel
Nonferrous alloys

Table 1.
Appendix A - cont'd

24. PRIMARY STEEL AND STEEL MILL PRODUCTS INDUSTRY

Specified product opportunities

Stainless and alloy steels
Rolling mill products, including plate, strip, sheet, shapes,
bars, and rods

Typical investment characteristics

Large investment in machinery and equipment
Employment 1,000; females negligible

Representative unit operations or processes

Alloying materials in electric furnace operation
Casting billets, blooms, and slabs
Rolling, drawing, and extruding into finished mill products

Major end uses

Process equipment manufacture
Electrical apparatus
Appliances and kitchenware
Construction
Industrial machinery and equipment

Table 1.
Appendix A - cont'd

25. PLASTIC RESINS, ADHESIVES, AND RELATED COMPOUNDS INDUSTRY

Specified product opportunities

Plywood and particle board bonding resins
Textile treating compositions
Tufted carpet latexes
Paper coatings, sizings, and impregnating compositions

Typical investment characteristics

Moderately high investment in machinery and equipment
Employment 50; females 10%

Representative unit operations or processes

Solution and emulsion compounding from purchased ingredients
Resin manufacture
Latex formulating
Dry powder blending

Major end uses

(See specified product opportunities)

Table 2.
Appendix A
Statistical Measures of Locational Activity and Geographical Prevalence 1/

Rpt. No.	Industry	Total 1958 Plants	Total 1963 Plants	Net Increase (Decrease)	Percent Change '58-'63	1963 Appalachia % of U.S.	1966 Plants	
							Employ	Over 50 2/ Appalachia % of U.S.
1	Paper & Allied Products Appalachia Total U.S.	92 1,661	102 1,928	10 267	10.9 16.1	5.3	54 1,070	5.0
2	Textile Mill Products Appalachia Total U.S.	596 3,366	633 3,082	37 (284)	6.2 (8.4)	20.5	373 1,573	23.7
3	Apparel Appalachia Total U.S.	707 10,096	846 10,044	139 (52)	19.7 (0.5)	8.4	534 3,305	16.2
4	Printing & Allied Industries Appalachia Total U.S.	36 1,420	37 1,169	1 (251)	2.7 (17.6)	3.2	16 308	5.2
5	Electrical Component Parts Appalachia Total U.S.	156 3,908	203 4,714	47 806	30.1 20.6	4.3	93 1,879	4.9
6	Textile Machinery Appalachia Total U.S.	132 1,755	153 1,892	21 137	19.9 7.8	8.1	50 604	8.3
7	Office Machinery Appalachia Total U.S.	22 345	29 512	7 167	31.8 48.4	5.7	14 244	5.7

Table 2. - Cont'd
Appendix A

Statistical Measures of Locational Activity and Geographical Prevalence 1/

Rpt. No.	Industry	Total 1958 Plants	Total 1963 Plants	Net Increase (Decrease)	Percent Change '58-'63	1963 Appalachia % of U.S.	1966 Plants	
							Employ Over 50	Appalachia Actual % of U.S.
8	Motor Vehicle Parts Appalachia Total U.S.	735 15,373	905 17,838	170 2,465	23.1 16.0	5.1	85 1,833	4.6
9	Chlor-Alkali Industry Appalachia Total U.S.	5 34	6 38	1 4	20.0 11.7	15.8	7 64	10.9
10	Materials Handling Equipment Appalachia Total U.S.	44 763	45 887	1 124	2.3 16.3	5.1	11 250	4.4
11	Mobile Homes Appalachia Total U.S.	16 386	22 413	6 27	37.5 7.0	5.3	33 428	7.7
12	Instruments & Controls Appalachia Total U.S.	47 1,274	48 1,366	1 92	2.1 7.2	3.5	30 485	6.2
13	Noncellulosic Synthetic Fiber Appalachia Total U.S.	3 14	6 25	3 11	100.0 78.6	24.0	17 82	20.7
14	Metal Stampings Appalachia Total U.S.	116 2,456	118 2,574	2 118	1.7 4.8	4.6	37 623	5.9

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Table 2. - Cont'd
Appendix A

Statistical Measures of Locational Activity and Geographical Prevalence 1/

Rpt. No.	Industry	Total 1958 Plants	Total 1963 Plants	Net Increase (Decrease)	Percent Change '58-'63	1963 Appalachia % of U.S.	1966 Plants	
							Employ	Over 50 2/ Appalachia Actual % of U.S.
15	Aircraft & Aerospace Parts Appalachia Total U.S.	15 1,200	17 1,000	2 (200)	13.3 (16.6)	1.7	4 307	1.3
16	Primary Aluminum Appalachia Total U.S.	4 20	4 23	3	15.0	17.4	5 48	10.4
17	Nonferrous Castings Appalachia Total U.S.	100 1,965	99 1,894	(1) (71)	(1.0) (3.3)	5.2	22 427	5.2
18	Malleable & Ductile Castings Appalachia Total U.S.	211 1,693	195 1,492	(16) (201)	(7.6) (11.9)	13.1	95 699	13.6
19	Foamed Plastic Products Appalachia Total U.S.	NA NA	NA NA	NA NA	NA NA	NA NA	12 3/ 133 3/	9.0
20	Rolling, Drawing & Ex- truding of Nonferrous Metals Appalachia Total U.S.	55 711	50 748	(5) 37	(9.1) 5.2	6.7	30 447	6.7

Table 2. - Cont'd
Appendix A

Statistical Measures of Locational Activity and Geographical Prevalence 1/

Rpt. No.	Industry	Total 1958 Plants	Total 1963 Plants	Net Increase (Decrease)	Percent Change '58-'63	1963 Appalachia % of U.S.	1966 Plants Employ Over 50 2/	
							Actual	% of U.S.
21	Meats, Dried & Frozen Produce Appalachia Total U.S.	506 6,110	503 6,102	(3) (8)	(0.6) (0.1)	8.2	74 1,242	6.0
22	Plastic & Powder Metal Products Appalachia Total U.S.	128 3,451	198 4,616	70 1,165	54.7 33.8	4.3	45 1,046	4.3
23	Refractory Metals Appalachia Total U.S.	5 29	2 35	(3) 6	(60.0) 20.7	5.7	12 46	26.1
24	Primary Steel & Steel Mill Products Appalachia Total U.S.	185 712	166 745	(19) 33	(10.3) 4.6	22.3	147 585	25.1
25	Plastic Resins Appalachia Total U.S.	21 349	32 509	11 160	52.4 45.8	6.3	28 365	7.7

NOTES:

1/ Source: 1958 and 1963 Census of Manufactures, except as otherwise noted

2/ Source: Dun & Bradstreet, Inc. Data Bank, May 1966, except as noted under 3/ following

3/ Source: Stanford Research Institute, Menlo Park, Calif., and Fantus Area Research files